

PUBLIC WORKS

Dec.
1953

CITY, COUNTY AND STATE

Town and Gown Partnership
In Sewage Disposal

An Architect Designs a
Pumping Station

Soil Cement is a Versatile
Highway Material

Here's How You Can Get
Construction Safety

Steel Reinforcement for
Asphaltic Concrete

Design and Application
of Oxidation Ponds

Putting Public Works
On the TV Program



D. C. Wesche, Ass't. City Manager and Director of Public Service, Manhattan, Kansas, was a key man in rebuilding after 1951 flood. See page 22.

*This message first appeared in January 1952
We consider it just as important today*

WHAT'S A WHOLESALER?



At the end of every production line rises the greatest single responsibility of business—the profitable distribution of a product. So important is this responsibility that men all over the world dedicate their minds, money, voices, hands, eyes, ears, noses, nerves, and sometimes their very lives to its fulfillment.

As a group these men are termed "Salesmen," "Representatives," "Agents" and "Reps." They are called other things frequently.

So intent are they on marketing their products successfully, and so dire are the consequences if they don't, that they solicit the help of one of the most singularly important influences in the distribution cycle—the wholesaler.

The wholesaler has been known as a "Jobber," "Distributor," "Dealer" and smiles more often when called a wholesaler than by any other name.

He is linked to reputable manufacturers by supply, to their salesmen by merchandising, to his family by love, his employees by loyalty and to his customers by outstanding service and friendship.

He places more orders, receives more merchandise in greater variety, stocks and restocks more shelves, makes more shipments in less time, holds more confidences and credit across longer counters with a larger capital investment in a smaller area than does either his suppliers or his customers.

Every day he dispenses more information on a wider variety of products than is provided in the literature furnished him. It is taken from years of experience and is added to the knowledge of the craftsmen who are his customers.

The wholesaler can be counted among the members of leading associations, civic groups, fraternal orders, religious societies, country clubs and bowling leagues. His divergent interests compel him to be up early and out late. His favorite but rare relaxations are found at home, on vacation, with a fishing rod or behind a bird dog; at a card table and over a cup of coffee with Joe around the corner.

The wholesaler is not typically a small businessman, neither is he a tycoon; rather he is a well established, highly regarded commercial institution; sincere, practical, reliable; and on his shoulders rests the production lines of tomorrow—profitable distribution today.

**BUY FROM YOUR
WHOLESALER**



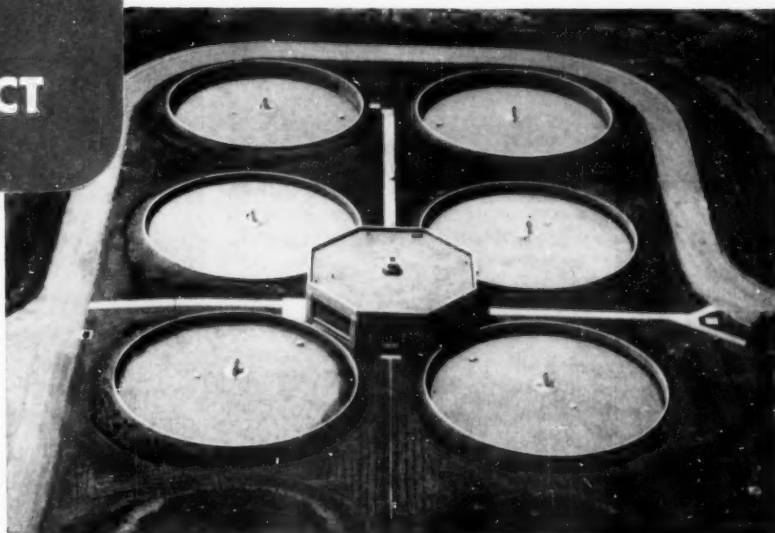
WOLVERINE TUBE DIVISION,
Calumet & Hecla, Inc., *Manufacturers
of Quality-Controlled Tubing*, 1451
Central Avenue, Detroit 9, Michigan.
Plants in Detroit, Michigan and Decatur,
Alabama.

ACCELERATED SLUDGE DIGESTION NOW A FACT

CRP

CATALYTIC REDUCTION PROCESS

Exclusively through the Catalytic Reduction Process*



The Catalytic Reduction Process completes biological sludge digestion in one-third to one-fourth of digester volume generally required. The Process accomplishes this by digesting at solids loading rates three to four times those being practiced. This accelerated digestion is simple and economical, using only the natural products of anaerobic decomposition.

Originating in 1946, the Process was developed, tested and verified over six years on both laboratory and pilot plant scale. The results obtained in the pilot plant operation have been proven in full scale plant operation at the Columbus, Ohio Sewage Treatment Works in 1952 and 1953.

The Catalytic Reduction Process applied to one 70' tank at the Columbus Plant digested 3.38 times the quantity of sludge solids digested in a similar tank in parallel operation not using the Process. The tank operated under the Process produced a reduction of solids within established ranges, normal gas production and readily drible odorless sludge.

The Catalytic Reduction Process is now available for consideration by consulting engineers for application on plants under design and for plants requiring expansion. The Process when applied to overloaded digesters will provide sufficient capacity without additional tanks.

**The only proven Process for accelerating biological digestion. (Patents applied for.)*

The Catalytic Reduction Process is offered through the Catalytic Reduction Co., Inc. a subsidiary of the Chicago Pump Company.

CHICAGO PUMP COMPANY SEWAGE EQUIPMENT DIVISION

622 DIVERSEY PARKWAY

Flush Klean, Scrub Peller, Plunger,
Horizontal and Vertical Non-Clogs
Water Seal Pumping Units, Samplers



CHICAGO 14, ILLINOIS

Swing Diffusers, Stationary Diffusers,
Mechanical Aerators, Combination
Aerator Clarifiers, Comminutors.

Need more facts about advertised products? Mail your Readers' Service card now.



Jefferson County Commissioners, left to right, Walter True, Emil M. Schneider, and George S. Grun, shown with their Caterpillar-powered Lorain dragline. Leading manufacturers can supply Caterpillar power in their equipment.



"We have nothing but praise for Caterpillar equipment."

These are the words of Colorado's Jefferson County Commissioners. And they have a good solid basis for saying it—*experience*.

In the picture above, a Cat* D318 Diesel Engine powers a Lorain dragline as it scoops up granite and feeds it into the hopper of a Universal crushing plant. The crusher is powered by a rugged D8800. The County also owns six No. 12 Motor Graders, several D7 Tractors and other Caterpillar-powered units.

Many counties are standardizing on Caterpillar-built equipment. In addition to the quality that is built into every unit, there are many further advantages in buying all-Caterpillar. Operators get to know what their machines can do, and become more efficient. Mechanics don't have to read service booklets every

time they service a unit. Parts inventories are greatly simplified, and when parts and outside service *are* needed, you can rely on your Caterpillar Dealer. Let him show you now how you can get more for the taxpayer's dollar with Caterpillar power.

Caterpillar Tractor Co., Peoria, Illinois.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

**SPECIFY CAT POWER
FOR HIGH-PROFIT
PERFORMANCE**

THE MOST USEFUL ENGINEERING MAGAZINE

PUBLIC WORKS



FOR CITIES, COUNTIES AND STATES

OFFICERS

W. A. Hardenbergh, President
Croton Morris, V. Pres. & Treas.
A. Prescott Folwell, Secretary

EDITORIAL DEPARTMENT

Editors

A. Prescott Folwell
W. A. Hardenbergh

Managing Editor

Edward B. Rodie

Highway Consultant

George E. Martin

Editorial Assistant

Helen E. Quinn

Columnists

George E. Symons
Leo J. Ritter, Jr.

Art Consultant

Nathaniel Poussette-Dart

BUSINESS DEPARTMENT

General Manager
Croton Morris

Director, Advertising
and Research
Arthur K. Akers

Production Supervisor
I. James Barger

Circulation Supervisor
Edward B. Rodie

CONTENTS FOR DECEMBER, 1953

Sail Cement is Versatile	61
Public Works of San Diego on TV. By Richard Gallagher	64
Sewage Treatment "Town and Gown" Partnership. By J. L. Morrison	65
Pavement Marker Spray Paints Equipment. By C. K. Rush	67
An Architect Designs a Pumping Station. By G. T. Hirsch	68
Restoring the Serviceability of Concrete Pavements. By M. W. Fisher	70
Fire Protection for Sludge Drying Plant. By W. K. Morgan	72
Evanston's Engineered Traffic Safety. By Phil Hirsch	74
Disposal by Sanitary Fill Costs 77.4 Cents per Ton. By C. E. Wright	76
Good Equipment for the Swimming Pool. By N. P. Miller	77
Metropolitan Council for Toronto and 12 Suburbs. By James Montagnes	79
Hammond Speeds Up Street Sweeping	80
If you Want Safety in Construction, Here is How to Get It	81
Measuring Flows and Computing Dosages	83
Rubber Asphalt Paving in New Jersey	85
Foresighted Selection of Dual Fuel Engine Cuts Costs. By M. E. Veltzen	86
Steel Reinforces Asphaltic Concrete	87

Heavy Macadam Salvages Old Pavement	88
Design and Application of Oxidation Ponds. By D. F. Smallhorst	89
The Wages of Tools. By W. M. Henderson	98
Sanitary Fill Successful in High Ground Water Area	116
Treatment of Slaughterhouse Wastes	119

PUBLIC WORKS DIGESTS

The Highway and Airport Digest	100
The Water Works Digest	107
The Sewerage and Refuse Digest	115

DEPARTMENTS AND SECTIONS

The Editor's Page	7	APWA News	91
"Jack" Ritter	14	Washington News Letter	94
"Doc" Symons	18	Lighting & Traffic	106
Leaders in Public Works	22	New Public Works Equipment	127
Letters to the Editor	24	Worth Seeing	133
The Engineers' Library	32	Worth Telling. By A. K. Akers	134

NBP

ADVERTISING OFFICES

New York 17, 310 East 45th St.
L. C. Morris, Eastern Sales Mgr.

Cleveland 10, Ohio, Villa Beach 2, 15445
Lake Shore Blvd.
Burton M. Yost, District Mgr.

CCA

Chicago 11, Ill. 612 N. Michigan Ave.
Robert J. Shea, Mid-West Sales Mgr.

Los Angeles 36, Calif.
505 S. Alendale Ave.
Smith & Hollyday

San Francisco 4, Calif.
Russ Building
Smith & Hollyday

Established 1896
Published Monthly by Public Works Journal Corporation. Office of Publication at Orange, Conn. Editorial and Advertising offices at 310 East 45th Street, New York 17, N. Y. Subscription rates: U.S.A. and possessions, \$5.00. Canada and South America, \$6.00. All other countries, \$7.00. Single copies 50¢ each, except special issues which are \$1. Acceptance under Section 34.64 P. L. & R. Authorized.

Public Works T. M. Reg. U.S. Pat. Off. Copyright 1953 by
PUBLIC WORKS JOURNAL CORP., 310 East 45th St., New York 17, N. Y.



MAIL THIS INQUIRY SHEET *today*

NATURAL RUBBER BUREAU
1631 K Street, N. W., Washington 6, D. C.

With no obligation, please send me engineering data for laying a test strip of natural rubber-asphalt pavement as follows:

1. Length of proposed test strip miles
Width of proposed test strip feet

2. New Construction ☐ Resurfacing ☐

PLANT MIX

Type: Hot ☐ Cold ☐

Grade of Asphalt

Penetration

Depth of Top Course inches

Aggregate Content%

Aggregate Top Size%

Bitumen Content%

SURFACE TREATMENT

Grade of Bitumen

Application Rate.....gals. per sq. yd.

COVER MATERIAL

Type of Aggregate

Size of Aggregate

Lbs. per sq. yd.....

Name

Title

Dept.

Address

City..... State.....

☐ Please send booklet "STRETCHING HIGHWAY DOLLARS WITH RUBBER ROADS"

☐ Please send information about new 30-minute motion picture on rubber roads



may be
**Your Way To
S·T·R·E·T·C·H
Highway Dollars**

Results from more than a score of test roads of natural rubber laid in the U. S. as far back as 1949 give definite promise of a new era in highway building. Both laboratory and in-place studies indicate that natural rubber roads will last longer, require less maintenance, and aid greatly in stretching our burdened highway budgets.

The Natural Rubber Bureau's Research Laboratory is staffed with experienced highway engineers who are ready to assist you in planning and installing test strips of natural rubber roads.

Do you have a question on rubber roads? For the answer, just mail the inquiry sheet, or write direct.

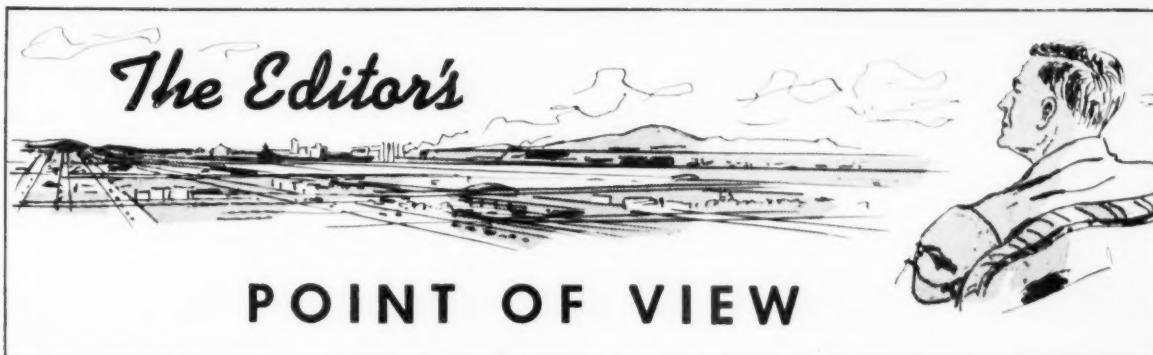
**Natural Rubber
Bureau**

1631 K STREET, N. W. WASHINGTON 6, D. C.

Natural Rubber Bureau Research Laboratory
Rosslyn, Virginia



Get full details of this month's products...mail your Readers' Service card today.



Looking Forward: A Preview of Better Things for 1954

EACH year we try to make some marked stride forward toward greater usefulness to our readers and help to the engineering profession generally. So for the coming year we have new things in store. Our readers will note in the January issue the first use of four-color illustrations of engineering works, we believe, in an engineering magazine. During 1954, other issues will carry, from time to time, four-color illustrations of other types of engineering works. In January, also, will be another of our long and complete articles, like those which, during the past year, brought so many complimentary letters from our readers. Still other such articles will appear from time to time during the coming year. In February, our publication date will be stepped up so that you should receive your copy of Public Works around the first of the month—some two weeks earlier than now. These are only a few of the new things you will find in Public Works during 1954. As we said a year ago, there are still lots of good ideas waiting to be thought of—and we intend to do our share in digging them out.

Helping to Meet the Needs for An Effective Health Program

AN important segment of the field of public health, the National Sanitation Foundation, a non-profit organization, is doing a fine job. One of the problems in sanitation, and especially in food-handling and preparation, has been the varying requirements and lack of standards, from city to city, for equipment. The NSF has undertaken to develop fair standards for such equipment and to get these widely adopted. It has established a first-class laboratory service for testing equipment and has employed highly equipped personnel to operate the service. As would be expected, progress was slow initially, but a great deal has been accomplished and more is in store for the future. We believe that such an organization, representing both industry and the user, is superior to any government-operated service of a like nature, and we congratulate NSF on eight years of progress in its dedicated field.

Why We Need Sound Plans for Civil Defense and Emergencies

TWO recent events, far separated, emphasize the need for better planning to meet emergencies—and perhaps for other things as well. In Atlanta, the bursting of a large water main flooded Northside Drive and caused one of the worst traffic jams in the history of that city. Things could have been worse had it not been for the skills, resources and management ability of the water department, which repaired the damage in a hurry.

Up in southern New York state, a violent storm, combining snow and wind, came up out of nowhere—as emergencies have a habit of doing—and traffic was tied up on Route 17 for more than 20 hours. Data are not yet available to tell the story of who or what failed, but it appears that proper delegation of authority had not been made to on-the-spot state officials so that prompt action could be taken. Whether or not the current rumors concerning the cause of the breakdown are well-founded, the fact remains that there was an emergency and it was not met.

Merry Christmas and a Happy New Year to You All

ANOTHER holiday season and another New year will be with us soon after this issue of Public Works reaches its readers. So here and now we wish all of you a Merry Christmas and a Happy New Year—the best year you have ever had. And, as we said last year, whatever we can do to make this next year a better and more prosperous one, that we are happy to do.

And Thanks to the Many Who Have Helped Us Do Better

IT WOULD not be proper to close this year-end message without expressing our most sincere thanks for the encouragement and help that we have received from so many. Production of a magazine such as this would not be possible without the enthusiastic, hearty and continued support of our readers, which we seem unusually privileged to enjoy. Articles, suggestions for articles and oral and written comments have been numerous. We appreciate these and we thank you for the help they have been to us.

How the best product in its field has been made still better

Not overnight, of course—but by a series of improvements gained through research and development resulting in *modernized* cast iron pipe. Tougher, stronger, tuberculation-proof pipe with sustained carrying capacity. Centrifugally cast and, when needed, centrifugally cement-lined.

All of our member companies have centrifugal casting facilities for producing tougher, stronger *modernized* cast iron pipe. All can supply this pipe with cement lining centrifugally applied, resulting in sustained carrying capacity, reduced friction loss and lower pumping costs.

If you want the most efficient and economical pipe ever made for water distribution, your new mains will be laid with *modernized* cast iron pipe with either bell-and-spigot or mechanical joints.

Cast Iron Pipe Research Association, Thos. F. Wolfe,
Managing Director, 122 So. Michigan Ave., Chicago 3.



CAST  IRON

The Q-Check stencilled on pipe is
the Registered Service Mark of the
Cast Iron Pipe Research Association.

Modernized **cast iron**

Now's the time to mail this month's Reader's Service card.



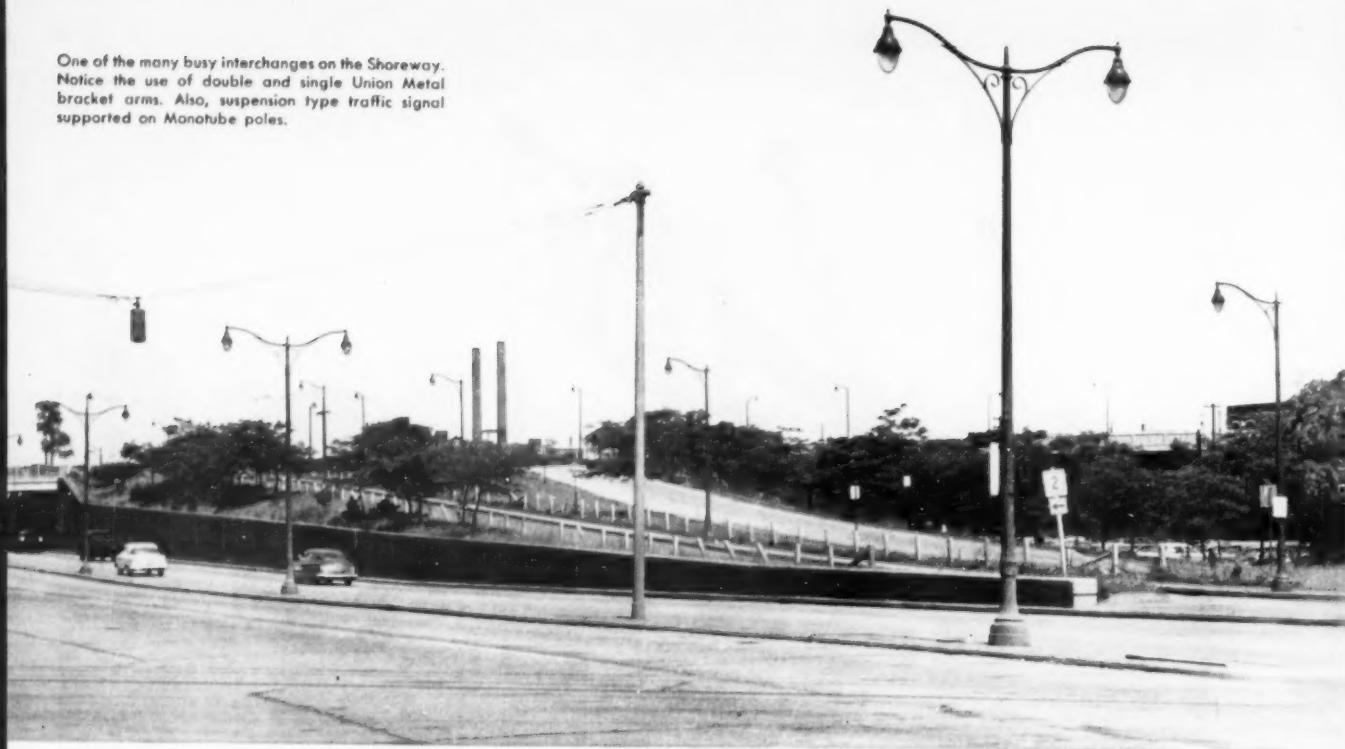
This cast iron water main, uncovered for inspection, is in its 106th year of service in Boston, Mass.—one of more than 45 cities with century-old water or gas mains in service.

pipe

for Modern Waterworks Operation

Need more facts about advertised products? Mail your Readers' Service card now.

One of the many busy interchanges on the Shoreway. Notice the use of double and single Union Metal bracket arms. Also, suspension type traffic signal supported on Monotube poles.



Modern Lighting

helps minimize driving hazards on Cleveland's Memorial Shoreway

HIGH speed traffic volume on Cleveland's Memorial Shoreway is so large at night that *modern* lighting is a must. Adequate illumination, properly positioned at intersections and approaches, has helped immeasurably in keeping the accident rate low after dark.

City after city finds Monotube lighting poles to be the best and most economical support for outdoor light . . . on streets, expressways and for many special applications.

It will pay you to include graceful, *cold-rolled* Monotube poles in your lighting and modernization plans. Sizes and types are available for every outdoor lighting need. Write The Union Metal Manufacturing Company, Canton 5, Ohio.

UNION METAL
Monotube Lighting Poles



Monotube poles are an integral part of this approach ramp railing. A good example of how Monotubes help solve installation problems.

LINK-BELT Straightline Sludge Collectors help treat 2 BILLION GALLONS of sewage per day



Easy, economical sludge removal provided for water and industrial waste treatment plants

Since the first Straightline Sludge Collector went into service at Gastonia, N. C., in 1921, the great majority of the country's rectangular settling tanks have been equipped with this Link-Belt design. Straightline action provides the shortest possible travel of collected material at slow, uniform speed. Result: minimum disturbance of flow and maximum efficiency. In addition, they have a proven record for uninterrupted operation with minimum attention.

Straightline Collectors are part of the complete Link-Belt line of quality equipment. Our sanitary engineers will be glad to work with your engineers, chemists and consultants—help you get the best in modern water, sewage or industrial liquids treatment equipment.

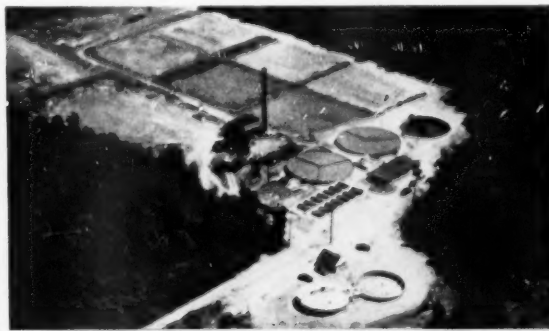
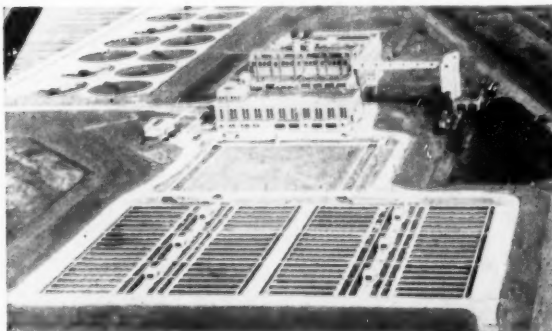
LINK-BELT

SANITARY ENGINEERING EQUIPMENT

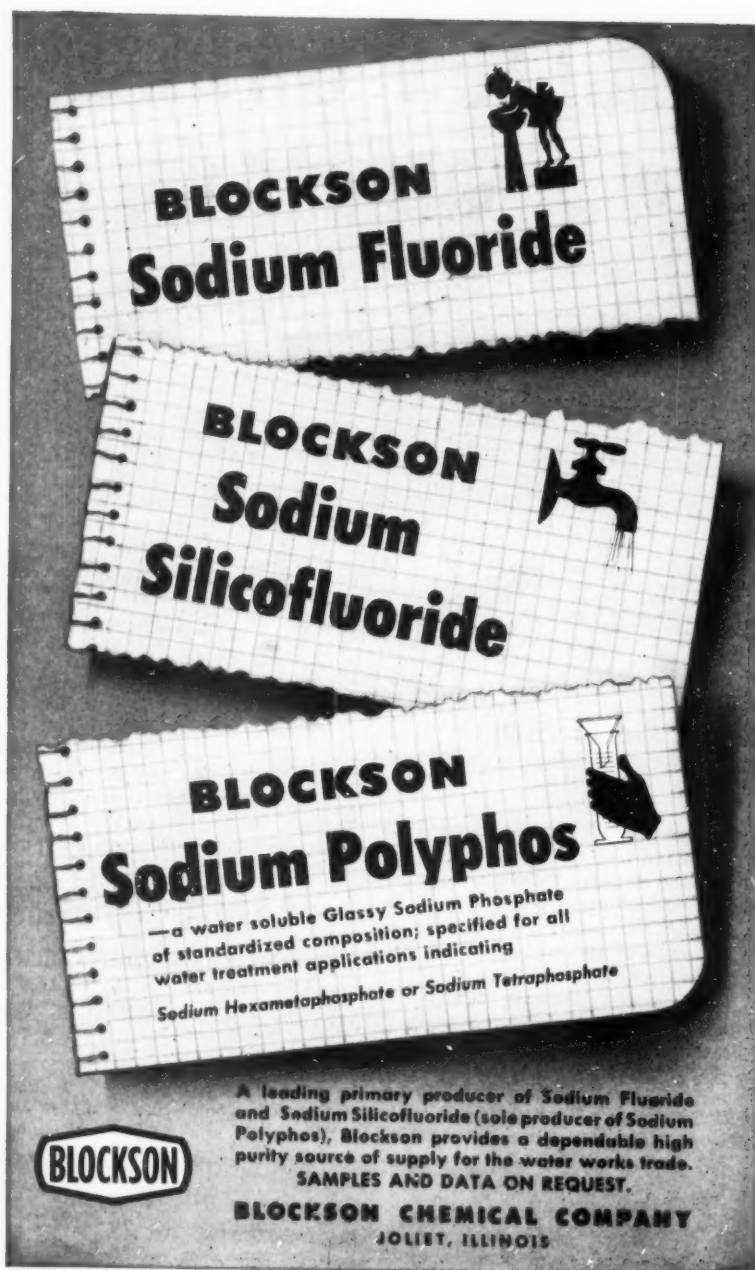
LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices in Principal Cities.

12,972

Straightline Collectors, for both primary and final settling tanks, equip plants from 80,000 up to 600,000,000 gpd. Shown here: a 600,000,000 gpd plant (left) and 6,000,000 gpd (right).



Get full details of this month's products... mail your Readers' Service card today.



BLOCKSON
Sodium Fluoride

BLOCKSON
Sodium Silicofluoride

BLOCKSON
Sodium Polyphos

—a water soluble Glassy Sodium Phosphate of standardized composition; specified for all water treatment applications indicating Sodium Hexametaphosphate or Sodium Tetraphosphate

BLOCKSON

A leading primary producer of Sodium Fluoride and Sodium Silicofluoride (sole producer of Sodium Polyphos), Blockson provides a dependable high purity source of supply for the water works trade.

SAMPLES AND DATA ON REQUEST.

BLOCKSON CHEMICAL COMPANY
JOLIET, ILLINOIS



FROM **ANY** ANGLE...

...**PAYLOADER PAYS**...

EVERYBODY concerned is pleased with the backfilling job John Rooff & Sons' "PAYLOADER" tractor-shovel is doing on this 12" water main installation. The contractor likes the 500 feet of daily progress being made . . . the water department knows it is getting a good solid backfill . . . the highway department is sure the "PAYLOADER" will not damage the pavement.

Dig! Load! Backfill! Stockpile! Lift! Carry! Strip! Push! Pull! The "PAYLOADER" does *all* these jobs. That is why it is one of the busiest machines on any project — and the most in demand. There are eight sizes of "PAYLOADERS," also a choice of four-wheel, rear-wheel or front-wheel drive to best fit your needs.

"PAYLOADER" Distributors — some 200-strong

in the U. S. and Canada — are ready to serve you with their modern parts department and service shops manned by experienced personnel. From ANY angle, it will pay to buy a "PAYLOADER" tractor-shovel — a *complete* unit built by the tractor-shovel pioneer, The Frank G. Hough Co., 761 Sunnyside Avenue, Libertyville, Illinois.

A SIZE FOR ANY JOB

Full information on any "PAYLOADER" model is yours on request:

Four-wheel drive Models HM —
1 1/2 yd. and HR — 1 yd.;
Rear-wheel drive Models HY —
1 1/4 yd., HFH — 1 1/8 yd.,
HF — 3/4 yd., HE — 1/2 yd.;
Front-wheel drive Models HAH —
1/2 cu. yd., HA — 12 cu. ft.



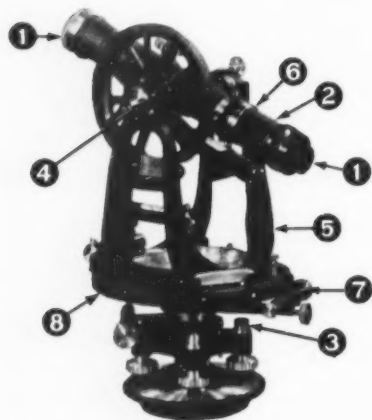
PAYLOADER®
THE FRANK G. HOUGH CO. • Since 1920



Need more facts about advertised products? Mail your Readers' Service card now.

Ask the man behind the "gun"...

How these 8 major design advances make White the top engineers' transit



1. Coated optics.
2. An optics system redesigned to achieve more effective aperture.
3. Covered leveling screws.
4. Improved telescope bearings.
5. New "U" design standard.
6. Glass Reticules.
7. Improved design and hand-lapped tangent screws.
8. Centrifugal castings.

TOMORROW as in the past, White Engineers' Transits will continue to offer the most up-to-date design and construction features. This results in greater accuracy, longer instrument life, easier use. To get all the details write for Bulletin 1053. DAVID WHITE CO., 399 W. Court St., Milwaukee 12, Wis.



We offer
the most expert
REPAIR SERVICE
on all makes,
all types of
instruments.

UP FRONT FOR ADEQUATE ROADS

BY
LEO J. RITTER, JR.



Yield Signs — An interesting development in the field of traffic control is the increasing use of signs marked "Yield Right of Way" at urban street intersections. Signs of this type are used at intersections which require some degree of control, but traffic volumes or other factors are not sufficient to warrant the use of either a stop sign or a traffic signal. The motorist who proceeds against the "Yield" sign is required to keep his vehicle under control to the extent that he can stop and yield the right-of-way to a vehicle approaching either from the left or right on the intersecting street. Signs of this type have recently been installed at 20 intersections in New York City; other trial installations have been made previously in other sections of the country. In New York, these reflectorized signs have a blue background and silver lettering. Also, more and more agencies are adopting the red "Stop" sign, particularly at dangerous rural intersections. South Dakota has recently made the red sign standard on the state highway system.

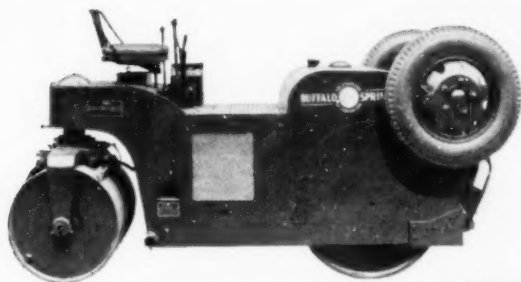
Welded Wire Fabric — The most recent experimental installation of welded wire fabric to "reinforce" an asphaltic concrete pavement has been completed in Washington, D. C. Approximately 3000 square yards of 16th Street, N. W., near Alaska Avenue, were paved with a wire mesh-bituminous combination. Purpose of the wire fabric is to prevent the formation of ripples and waves in the pavement and to control cracking. The "District" project was under the supervision of H. F. Clemmer, Materials Engineer. The first application of this method that the writer knows about was shortly after the end of World War II, when the Texas Highway Department resurfaced a section of U. S. 90 between Houston and Beaumont in this fashion. Other experimental in-

stallations have been made in Indiana, Illinois and Minnesota. The method offers great possibilities, particularly in resurfacing projects and in the paving of bus stops on city streets, locations which are particularly susceptible to the formation of waves and bumps on bituminous pavements because of the lateral forces set up by the braking action of heavy vehicles.

Conventions — The annual meeting of the American Society of Civil Engineers took place in New York late in October. As usual, it was much like a three-ring circus, with a number of technical sessions going on at the same time, most of the time. The highway boys were quite active this year, although most of the papers were centered around two major improvements; the colossal New York State Thruway (main section 427 miles in length) and the Chesapeake Bay Bridge. Add trivia — B. D. Tallamy of the NYSTA says that all the blueprints required for the Thruway, if laid end to end, would stretch from New York City to Norfolk, Virginia. Don't forget the ARBA meeting in Atlantic City and the HRB meeting in Washington next month.

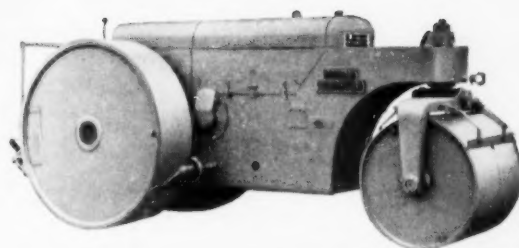
Pennsylvania Poll — Basic data of value in planning for the future of highways in Pennsylvania was secured in a public opinion poll, results of which were recently announced by E. L. Schmidt, Secretary of Highways. The poll was conducted by the Highway Department's division of planning and traffic over a five-month period in 1952. The poll was conducted by means of home interviews involving selected families representing typical groups in both rural and urban communities. Surprisingly enough, in view of the high cost of living and the present tax situation, results of the interviews showed a broad understanding of the need for highway improvements and their financing. The poll indicated that 73% of the persons interviewed felt that more money should be spent for highway

(Continued on page 105)



BUFFALO-SPRINGFIELD KT-7

World's most useful 3-5 ton portable roller! Ruggedly built, with guide and drive rolls of heavy steel plate. Compact 4-cylinder engine delivers 24.2 horsepower through a simple, troublefree two-speed transmission and famous Buffalo-Springfield bevel gear final drive. Easily rigged for towing, has built-in hydraulic jack to raise drive roll. Ideal for driveways, parking lots, road and street maintenance. Ask for Bulletin S-58-49.

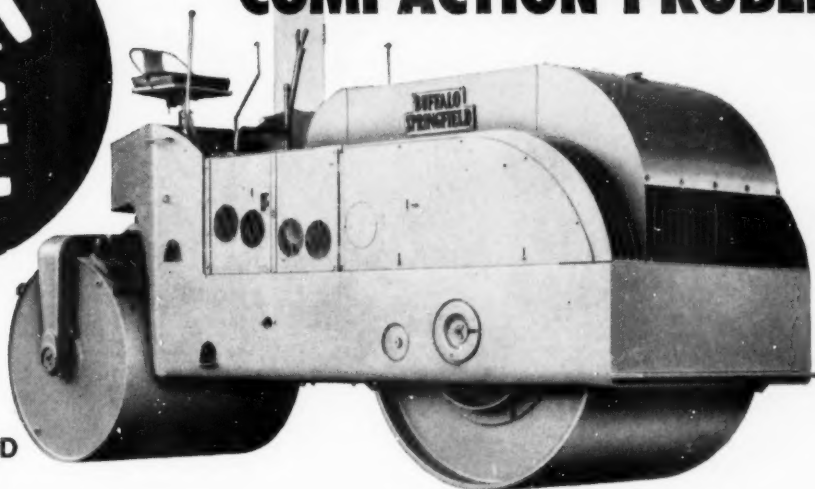


BUFFALO-SPRINGFIELD 3-WHEEL ROLLER

Heavy-duty engineered for continuous service on toughest jobs. Features that give you wide job versatility... Exclusive 4-speed transmission to provide a continuous range of roller speeds from 1.1 to 5.0 mph, all at full engine power. Machine-finished ballast-type rolls. High-speed, low-torque clutches for even, smooth reversing. Many more. Models for weights from 5 to 17 tons. Ask for Bulletin S-60-50.



FOR THE ANSWER TO YOUR COMPACTION PROBLEM

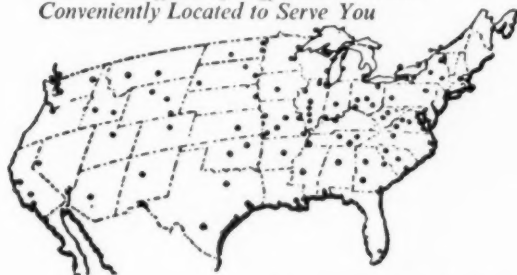


BUFFALO-SPRINGFIELD C-MODEL TANDEMS

Feature engineering advancements offered by no other 2-axle tandems. New open grill allows operator to see drive roll from normal seated position, makes it easy to work close to curbs and shoulders. More ground-to-frame clearance than ever—increased to 17" on 5 to 9 ton tandems, 20" on 10 to 16 ton tandems. Rolls close to high curbs, forms and other

obstructions. Exclusive 4-speed transmission provides full governed horsepower at all speeds from 1.1 to 5.0 mph. Heavy armored housing protects transmission and famous Buffalo-Springfield bevel gear final drive. These and many more profit-potential features make the C-Models your best buy in 2-axle tandems. Ask for Bulletin S-61-53.

*There's a Buffalo-Springfield Distributor
Conveniently Located to Serve You*



*Ask your distributor for
complete description and
specifications for model meeting
your requirements—or write to us*

BUFFALO-SPRINGFIELD
ROLLER COMPANY
SPRINGFIELD, OHIO



THE LEADER IN ROAD ROLLER DESIGN AND MANUFACTURE

It's a fact... our handy Readers' Service card is the way to get new catalogs.

For better trickling

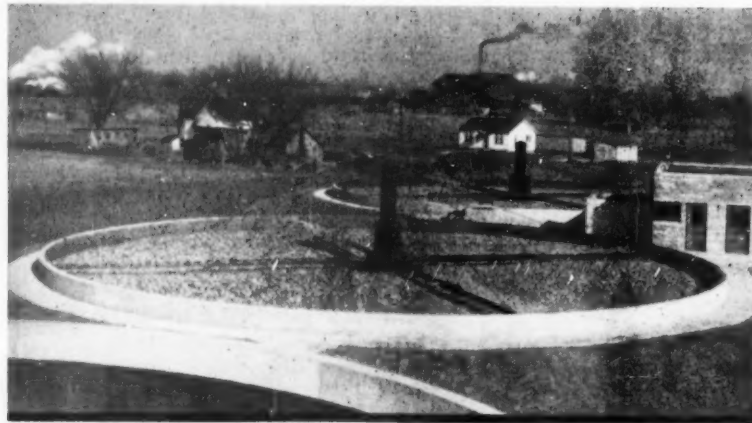
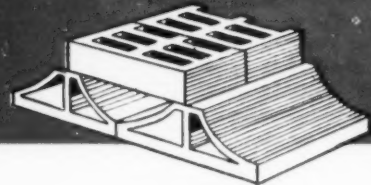
USE TFF INSTITUTE SPECIFICATION UNDERDRAINS

The scientific design of these *vitrified clay filter bottom blocks* insures trouble-free operation for the life of the filter. They have large top openings. That means proper ventilation of all filter media and free discharge of the filter effluent at all times. They have smooth run-off channels. That means quick drainage and no clogging even with years of operation. The blocks are light in weight, self-aligning and easy for unskilled labor to lay. After they have been laid they are strong enough to work on and to support even very deep filter media.

These modern underdrain blocks will carry applications up to 50 MGAD. They are best for all kinds and shapes of filters. They are used everywhere better operating results are desired.

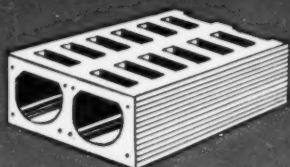
Use them to insure best results from your next trickling filter. Give it a *specification floor*. Use TFFI *vitrified clay filter bottom blocks*. For full engineering details write any member of this Institute today.

IMCO

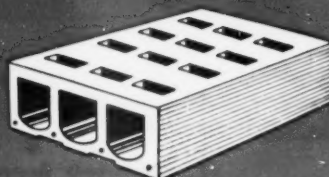


For more details circle No. 20 on the Readers Service Card

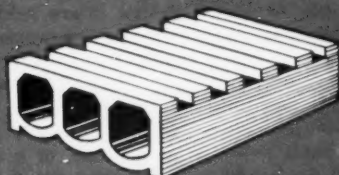
filter results...



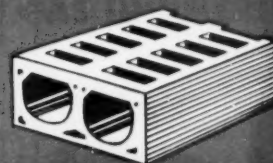
ARMCRE



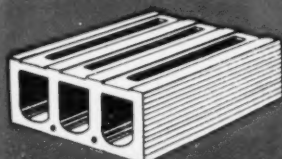
DICKEY



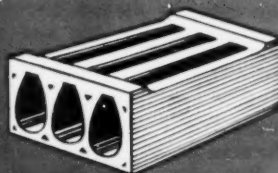
TRANSLOT



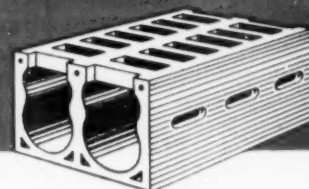
BOSCO



POMONA



NATCO

ACCELLO HI-CAP
(ARMCRE)

Here's the Payoff...

Washington, Ind.: Ten months of operation show the following results: Capacity 1.7 mgd; average sewage flow 0.936 mgd. Raw sewage BOD 61.2; effluent BOD 3.2. Suspended solids, raw sewage, 120 ppm; effluent

16 ppm. The population connected to the Washington, Ind. plant is 11,000. Data given here was reported by Jesse A. Behle, Supt. Municipal Utilities, Washington, Ind. and cover 10 months ending October 31, 1952.

If you don't have a copy of the 1954 "Handbook of Trickling Filter Design," ask any member of the Institute for a copy now.

TRICKLING FILTER FLOOR INSTITUTE

Ayer-McCord Clay Co., Inc.
Brazil, Ind.

Bowerston Shale Co.
Bowerston, Ohio

Industrial Materials Co.
Philadelphia 34, Pa.

Texas Vitrified Pipe Co.
Mineral Wells, Tex.

Natco Corporation
Pittsburgh 22, Pa.

Pomona Terra-Cotta Co.
Pomona, N. C.

W. S. Dickey Clay Mfg. Co.
Kansas City 6, Mo.

For more details circle No. 20 on the Readers Service Card

**"a pipe line
is no better
than
its joints"**

You Can Be SURE With

HYDRO-TITE

POWDER

HYDRO-TITE

(POWDER)

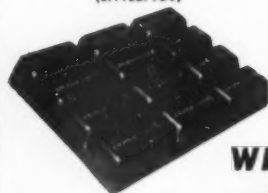


OR—

LITTLEPIGS

HYDRO-TITE

(LITTLEPIGS)



WITH

FIBREX

FIBREX

(REELS)



MAKE PERFECT JOINTS
Hydraulic Development Corp.
MAIN SALES OFFICE
50 CHURCH ST., N. Y. C.
General Offices and Works:
W. Medford Sta., Boston, Mass.

People, Ideas and Events

BY "DOC" SYMONS



H.T.M.A. — And let me be the first to wish you a Happy Holiday Season!

★ ★ ★

Somebody Goofed — A bout with a virus while I was enroute to the NEWWA meeting at Poland Spring in Sept. laid me low and I didn't make the shindig. I understand that I missed a humdinger of a meeting that drew more than 600 persons.

One sour note filtered back, however. Seems someone had the bright idea of making up the dinner menu by using names of equipment manufacturers with the various courses. You know—Peas a la "So and So Co.", Roast Beef a la "Such and Such Co.", Coffee a la "This and That Co."

Naturally only about a dozen companies could be named in the menu.—But what about the other two dozen or so companies who exhibited and all the other manufacturers' representatives who paid the special registration fee to help defray the cost of the banquet for the benefit of the actives.—Methinks somebody Goofed!

★ ★ ★

Like the famous rumor of Mark Twain's death, which he labeled as "grossly exaggerated" when he heard of it, "Sig" Sigworth of Industrial Chemical Sales called us for a correction on our November "rumor" that he is leaving the water works field. He assures us that he is not—that he is only temporarily diverted to the oils and that he will be back in his first and main love, Nuchar sales, just as soon as oils sales have been brought up to the over-stuffed condition of the Nuchar books. We are glad to publish this correction.

★ ★ ★

I Read Somewhere — "Pipes of copper were used in Egypt 5000 years ago, not only to convey water, but also steam, which was used to open and close temple doors by a sort of remote control system. The people

were completely mystified and attributed the feat to the magic power of the priests."—Remote control in water and sewage plants works magic today but the engineers who design it are seldom credited with mystical powers. — Maybe they should be!

★ ★ ★

Early Arrivals — Whether or not it was devotion to duty, a desire to be on time, or a chance to soak up some extra sun for the coming winter, I don't know, but there were a goodly number of folks who arrived in Miami two or three days before the FSIWA Convention began.

Recognizable behind dark glasses were: Mr. and Mrs. Henry Van der Vliet from New Jersey; Mr. and Mrs. John Horgan of R. B. Carter Co.; Mr. and Mrs. N. S. Bubbis, Winnipeg, Can.; "Bob" Gwynne of B-I-F Industries, Providence; John Stewart, Mgr., WSWMA; Mr. and Mrs. Fred Schad of Hardinge Co.; Fred Stuart, Jr., of Stuart Corp., Baltimore; Miss "Dottie" Dimmers, Secy. of WSWMA; and probably others I didn't see.

★ ★ ★

Luminous Quote — "No Law Enforces Itself"—Harvey Flint, Secy., R. I. Pollution Commission Information Committee, speaking before the NESIWA.

★ ★ ★

What's in a Name? — Remember when the Federation went through the throes of changing its name?—Well, the Miami Convention Bureau apparently thought the name was too long, so the hotels in Miami displayed "welcome" signs conveniently shortened to "Federation of Sewage and Industrial Wastes" or "FSIW".

Maybe they have an idea there.—Industrial Wastes have been mixed with, settled with, oxidized with, digested with, and incinerated with sewage—so why not "federated with"?

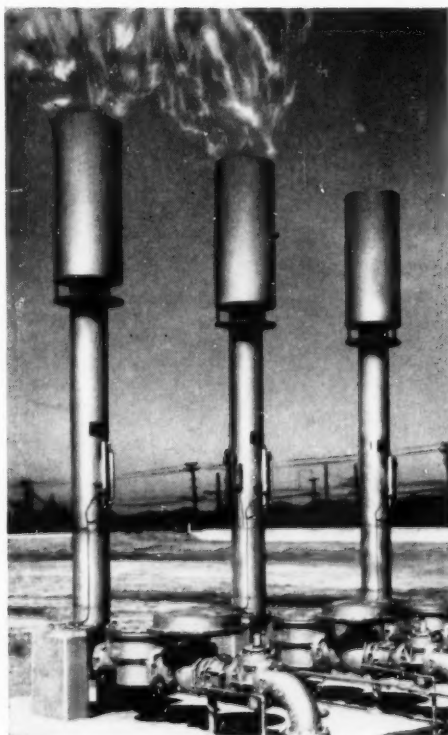
On the serious side, some of the
(Continued on page 126)

*In the East Bay Municipal Utility District plant
at Oakland, California . . .*



excess gas is safely burned with

P. F. T. WASTE GAS BURNERS



At this plant serving communities in the Bay area, three 95 ft. diameter digesters produce more gas than is needed for digester heating. To avoid resulting odor nuisance, East Bay's engineers have had three P.F.T. 6" Waste Gas Burners installed for safe, convenient elimination of excess gas.

For control and protection, each burner is equipped with a P.F.T. 4" Pressure Relief Waste Gas Flame Trap, completely eliminating hazards.

In addition to this gas safety equipment, the following P.F.T. products are installed in the plant: 3 Floating Covers for the 95' digesters; 3 Heater and Heat Exchanger Units (1,200,000 B.T.U./hr.); 3 Cover Position Indicators; miscellaneous gas control equipment.

Complete information and diagram of P.F.T. Gas Safety Equipment upon request—Bulletin 321.

*Design / Engineers of East Bay
of plant by / Municipal Utility District*

The P.F.T. Waste Gas Burner consists of a baffled burner pot mounted on top of an insulated pedestal. Burner pots are provided with adequate baffled air inlets to permit continuous operation of a gas pilot and provide for intermittent combustion of excess gas through a wide range of flows. The insulated pedestal minimizes formation of condensate and prevents freezing.



PACIFIC FLUSH TANK CO.

Waste Treatment Equipment Exclusively Since 1893

4241 RAVENSWOOD AVE.

CHICAGO 13, ILLINOIS

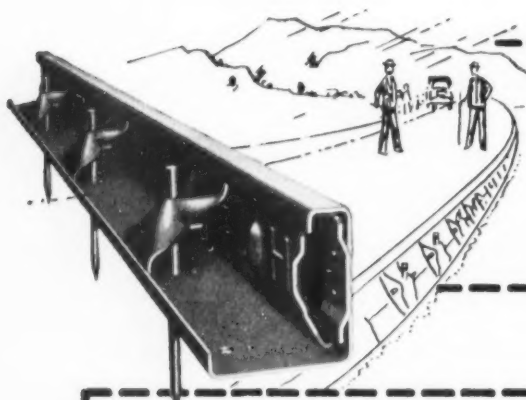
NEW YORK • LOS ANGELES • SAN FRANCISCO • CHARLOTTE, N. C. • JACKSONVILLE • DENVER

Now's the time to mail this month's Reader's Service card.

Here's How Leading Contractors Put an End to their Form Problems..

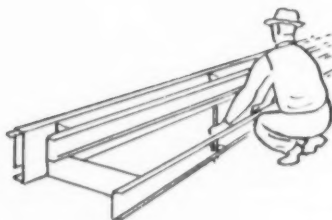
Here's the widest selection of steel forms available today. For more than 40 years, Heltzel has designed and built more types of forms than any other manufacturer. In fact, many form styles in general use to-

day were developed by Heltzel engineers, who are constantly revising and improving their products to give you modern equipment that will do a better job faster.



Here's why the Heltzel Highway Form is so popular: It's extremely easy to set and align — The flanged base means extra strength — All welded construction and "Special Analysis" prime carbon steel make it tougher — It has a positive lock that really supports and transfers the load — The extra wide tread gives greater traction — Helco stakes made from rerolled rail material are the toughest.

On airport construction the now famous Heltzel DUAL-DUTY Form enables contractors to work two different slab thicknesses with a single set of forms — a real feature because runway and taxi strip or ramp areas can be poured without purchasing a second set of forms. The Heltzel Dual-Duty form is a sturdy, versatile form especially designed to give years of lowest cost service.



Heltzel Curb and Gutter Forms are the quickest-setting available — Light in weight, yet rigid in construction, they are made to required specifications. A single set of forms can be made adaptable to a variety of curb and gutter combinations. Flexible and rigid radius forms can be made to match.

Write today for further details. Ask for Bulletin L-20.



HELTZEL STEEL FORMS

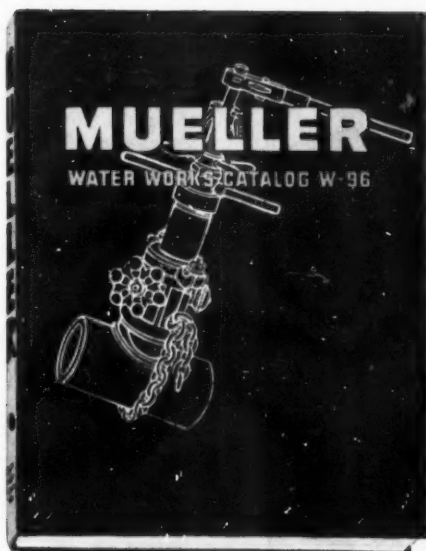
THE HELTZEL STEEL FORM & IRON CO., Warren, Ohio

It's a fact... our handy Readers' Service card is the way to get new catalogs.



MUELLER

*Have you received your
New W-96 Water Works
Catalog?*



The new Mueller Water Works Catalog is now off the press and its distribution has almost been completed. If you have not received your copy, please drop us a note — Dept. A-36, Mueller Co., Decatur, Illinois.

Catalog W-96 . . . 328 pages . . . the complete line of Mueller Water Works Distribution Products and useful engineering information.

MUELLER CO.

Dependable Since 1857

MAIN OFFICE & FACTORY DECATUR, ILLINOIS

Get full details of this month's products . . . mail your Readers' Service card today.

Here's why

SEWAGE TREATMENT PLANTS Modernize WITH

HOMESTEAD

Self-Seald...Lubricated

PLUG VALVES



HOMESTEAD "SELF-SEALD" LUBRICATED PLUG VALVES controlling raw, recirculated and digested sludge of 15 lbs. to 20 lbs. working pressure to heaters, digesters, and drying beds in a Sewage Treatment Plant.

- 1 THEY'RE SELF-SEALING.
- 2 THEY AUTOMATICALLY ADJUST FOR WEAR.
- 3 HAVE 100% LUBRICANT SEAL AROUND PORTS.
- 4 USE LESS LUBRICANT.
- 5 THEY GIVE POSITIVE SHUT-OFF AND REMAIN DROP-TIGHT for extremely long periods of time.

Homestead's exclusive Self-Sealing feature combines the positive sealing action of the tapered plug with the free turning action of a cylindrical plug type valve. And because they are Self-Seald—*automatically adjust for wear as wear occurs*—they assure extra long, leakless service . . . more operations between lubrications . . . require less maintenance and materially lower plant operating costs.

More than 10 years of gruelling service in almost every type of industry has proved them to be the lowest-cost-per-year means of fluid control within their service range.

We make them in semi-steel or cast steel; 100% port area or Venturi type; sizes 1/2" to 14" for 200 lbs. oil-water-gas working pressures; in Straight-Way or Three-Way types for Wrench or Worm and Gear operation, with High or Low Head Extensions, and Hand Wheels or Floor Stands.

Self-Sealing or one-piece plugs optional in Straight-Way type; 3-Way type has one-piece plug only. Complete data and prices on request.



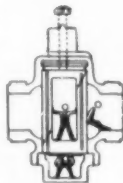
Write today for VALVE
REFERENCE BOOK No. 39-5

How the Amazing "SELF-SEALD" Principle Works

Homestead's patented "Self-Seald" principle is, we believe, the simplest and most effective sealing principle yet developed for lubricated plug valves.

In addition to a full lubricant seal around the ports, and around the top and bottom of the valve, the wedge-action of the plug under line pressure causes the finely-finished surfaces of the plug to press outward against the sealing surfaces of the body.

This self-sealing action keeps the plug surfaces in contact with the bore of the body. The plug automatically adjusts itself for wear, thus assuring extra long life and maximum leakless service.



HOMESTEAD

VALVE MANUFACTURING COMPANY

"Serving Since 1892"

P. O. BOX 40

CORAOPOLIS, PA.

Thousands use our Readers' Service card to keep up to date . . . do you?



LEADERS IN PUBLIC WORKS

★

D. C. Wesche is city engineer of Manhattan, Kansas. As such, he had a key part in the rebuilding of his city after the disastrous flood of July, 1951; some of this is told in an article a few months ago in *Reader's Digest*, which we hope all of you have read. A Kansas State graduate in CE, he got out just in time to serve with the Army during World War II. Except for that he has been with Manhattan ever since he got out of college. He is Assistant City Manager and Director of Public Service, in charge of Streets, Airports, Water, Park and Sewer Departments. Under his direction, Manhattan is now in process of developing a landfill program, and plans are under way for a new sewage treatment plant. The airport has been stage-constructed to meet scheduled airline needs. The tremendous growth in the city and contiguous area in 1952, some 25 percent, necessitates large-scale extension of utilities. Population is now about 22,000, or nearly twice what it was in 1940.

His professional memberships include ASCE, APWA, Kansas Engineering Society, FISWA and Kansas Association of City Engineers, of which he is Vice-president. His hobbies are basketball—a good mid-west habit—golf, hunting and fishing. He was married to Martha Mullen soon after he got out of college and now there are two Miss Wesches, Pamela and Linda. It must be a pleasure to Mrs. and the Misses Wesche to have a member of the family held in such high esteem and respect as "DC" is throughout Kansas.



CLAY PIPE

IS

*Completely
unaffected*

BY ACIDS



Laboratory tests *prove* Vitrified Clay Pipe is the *only* sewer pipe that's completely unaffected by sewer acids, corrosive gases, chemical and industrial wastes. These tests confirm what generations of contractors and engineers have learned through experience with Clay Pipe in actual service. In many instances sections of Clay Pipe, constantly exposed to corrosive chemicals for decades, have been dug up and found to be good as new!

Vitrified Clay Pipe is *chemically inert*. Acids can't corrode it. Strong detergents can't make it soft or spongy. Time can't weaken it. Regardless of the wastes that may flow through it, Clay Pipe is sure to last. Why take chances on substitute materials? Clay Pipe is always readily available. It's *guaranteed for 50 years!* And it never wears out!

NATIONAL CLAY PIPE MANUFACTURERS, INC.

1520 18th St. N. W., Washington 6, D. C.

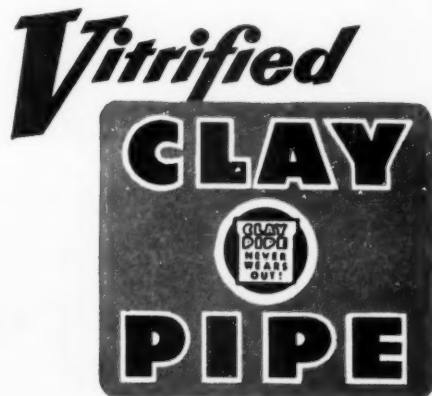
206 Connally Bldg., Atlanta 3, Ga.

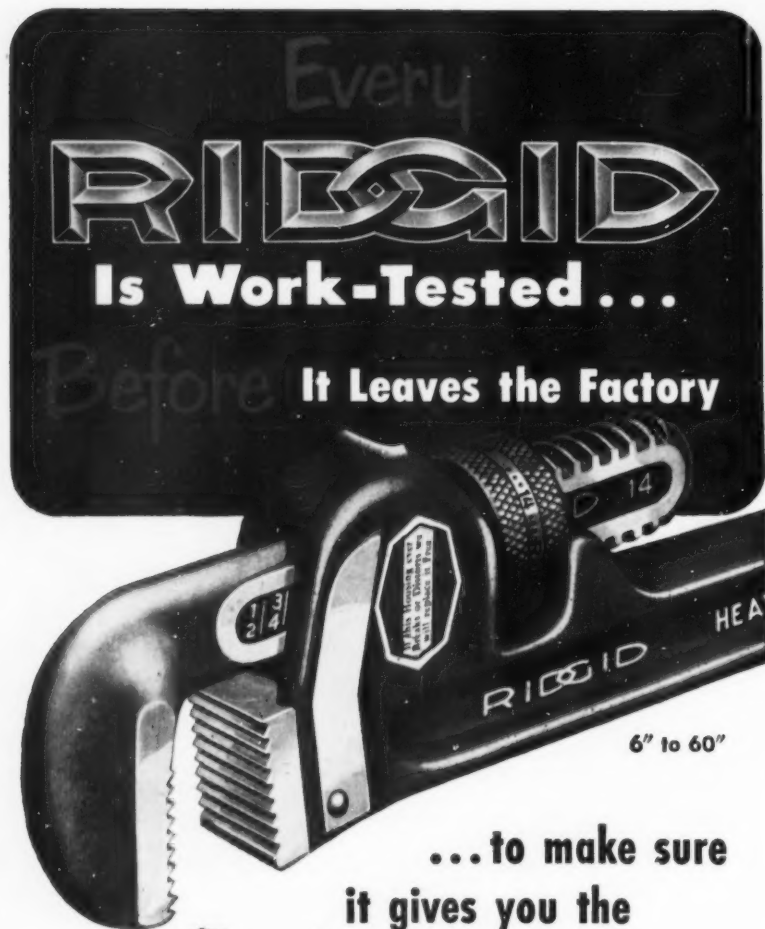
100 N. LaSalle St., Rm. 2100, Chicago 2, Ill.

703 Ninth & Hill Bldg., Los Angeles 15, Calif.

311 High Long Bldg., 5 E. Long St., Columbus 15, Ohio

ESSENTIAL • ECONOMICAL • EVERLASTING





...to make sure
it gives you the
Best and the Most
wrench service for your money

The reason **RIDGE** Heavy-Duty Pipe Wrenches are known for the brutal punishment they can take is because of the toughness built into them, checked part by part and then hard work-tested when assembled . . . not just one wrench in 100 or 1000 but *every last one!* . . . Add the guaranteed repair-free housing, no-slip no-lock jaws, handy pipe scale, easy spinning adjustment nut and comfort-grip I-beam handle and you see why genuine **RIDGE** gives you the big value for your money. Buy them at your Supply House.

THE RIDGE TOOL COMPANY • ELYRIA, OHIO



Now's the time to mail this month's Reader's Service card.

LETTERS TO THE EDITOR



INDEXES FOR PUBLIC WORKS

I have a suggestion that I am sure many readers would appreciate with respect to your magazine. I have filed every issue of **PUBLIC WORKS** Magazine since 1948 because they are so valuable. Might a yearly index be prepared? It would aid in making past issues a very important library for us who are in the public works field.

D. C. Wesche,
City Engineer,
Manhattan, Kansas.

ED. NOTE: Such indexes are prepared and are sent on request to anyone, but they are not bound in the magazine. Some back indexes are available on request; and the index for 1953 will be completed soon after the first of the year. If you want it, write and ask for it.

THOSE SOIL ARTICLES

. . . covers some of the basic information in a very readable manner. I will look forward with interest to the following articles to see how well this basic information can be applied to the practical problems of highway work. In too many cases, the difference between theory and practice is a matter of course.

Dean Wilson
Engineer of Maintenance
State Highway Commission
Jefferson City, Mo.

It is well written and a good one. However, I believe it is too technical for most of the towns to use as they do not have the money or the facilities for going into this matter.

Charles H. O'Brien
Dutchess County Supt.
of Highways
Poughkeepsie, New York

There is no doubt that the subject is one of special importance to all

LOUISVILLE LEARNED FROM EXPERIENCE

C-P-P* meets the

BIG 3 REQUIREMENTS

The Louisville Water Company picked Concrete Pressure Pipe for a new four-mile, 60-inch line because they want *Sustained High Carrying Capacity*.

Their decision was based on *experience . . . their own*.

While planning this line, they checked on the carrying capacity of earlier Louisville pipe . . . found two supply lines laid within two years of each other some twenty years ago . . . one concrete, the other not.

The concrete line's capacity is now 530,000 gallons-per-day more than when it was laid ("c" value increased from 145 to 149). The other line's capacity is 5,480,000 less ("c" value is down from 135 to 94).

That's the story in a nutshell, but . . .

This is only one of the reasons why the Louisville Water Company picked Price Pipe. Louisville has other reasons. Price Pipe's *long life*, for example. With Concrete Pressure Pipe, only concrete is exposed . . . and when buried in the ground, concrete is ageless as limestone . . . its life is measured in centuries.

And Louisville likes the *high strength* of Price Pipe. They know it's safe from external loads . . . that sudden and complete failure is all but impossible.

Finally, they like the *economy* of Price Pipe . . . for it gives them "Longest trouble free service at lowest cost" . . . because of its sustained capacity, long life and high strength, and because it is easy to lay, easy to tap, and easy to maintain.

Send for the facts on Price Pipe. Learn how your water lines can have long life, great strength and sustained high carrying capacity. Mail the coupon today.

*only CONCRETE
PRESSURE PIPE
MEETS THE
BIG 3
REQUIREMENTS

- 1 Long Life
- 2 Great Strength
- 3 Sustained Capacity



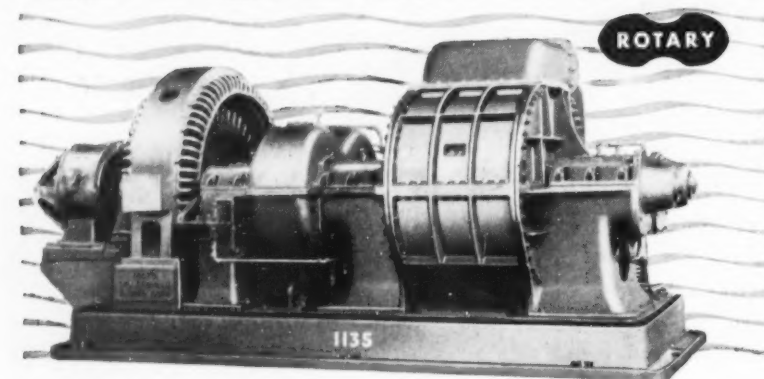
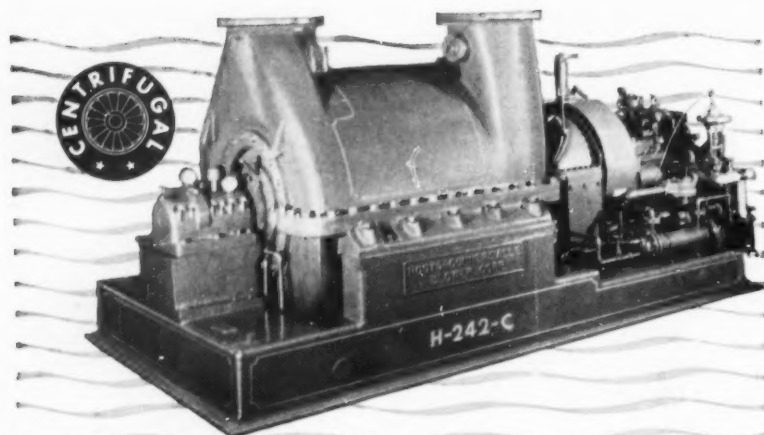
Price Brothers Company

1813 East Monument Avenue, Dayton 1, Ohio

Please send me, without obligation, the following literature:

<input type="checkbox"/> Check Sheet of Water Line Requirements	Name _____
<input type="checkbox"/> Facts on Prestressed Pipe	Title _____
<input type="checkbox"/> Price Pipe for Pressure Sewer Lines	Organization _____
	Address _____

It's a fact . . . our handy Readers' Service card is the way to get new catalogs.



BLOWER RELIABILITY A "NATURAL" WITH AIR-MINDED *Specialists*

The long record of reliability established by Roots-Connersville Blowers, Exhausters and related equipment is the natural result of almost a century of experience in the exclusive business of handling gas and air for industrial purposes.

But its more than just designing and building a piece of machinery. Such user satisfaction comes also from the wide range of capacities and types, from which the right unit can usually be selected. Especially important, our dual-ability line of Centrifugals and Rotary Positives enables us to make unbiased recommendations . . . a dual choice available only from Roots-Connersville.

Whatever your need may be in the handling of air or gas for sewage or water treatment plants, you can look to Roots-Connersville for unquestioned reliability and long-time economical performance. Ask us for specific recommendations on any problem of handling gas or air—in any quantity.

ROOTS-CONNERSVILLE BLOWER

ROOTS-CONNERSVILLE

*Exclusive
Specialists
in Handling
Gas and Air*



A Division of Dresser Industries, Inc.
153 Poplar Ave. • Connersville, Indiana

your readers. Generally the City, County, and State engineers have lagged behind the Federal and Private engineers in the use of this relatively new science of Soil Mechanics. The article as written I believe will appeal to your readers.

Thomas A. Middlebrooks
Department of the Army,
Office of the Chief of Engineers,
Washington, D. C.

CONTRACT MAINTENANCE

The editorial on highway maintenance in your September 1953 issue was read with interest. Because of the view you have taken we feel compelled to defend the procedure of doing numerous types of maintenance work by the contract method.

Where a contractor does a maintenance project, before the contract is awarded definite plans and specifications are prepared to permit the contractor to bid. Moreover, the owner's inspectors on the job see that the contractor does the work as planned. In contrast the agency using its own maintenance crews may do work without detailed plans and, since the maintenance crew then becomes both the engineer and the contractor, there is no check to see that the work is done to comparable standards.

It is true, as you state, that new construction lends itself readily to the preparation of clear and adequate specifications. But clear and adequate specifications also may be written for many types of maintenance work, such as resurfacing operations, painting of existing bridges, cleaning and resealing the joints of existing portland cement concrete pavements, replacement of guardrail posts and cable, and numerous other operations. This is proven by the fact that more and more highway maintenance is being performed successfully by contract.

Your editorial states that "it is desirable for every city and every county to have a moderate fleet of good equipment for highway maintenance and betterment." We sincerely believe that the contractors, because this is most important to their success, can match the government agencies for assembling equipment for maintenance work that will be both satisfactory and economical. A contractor stays in business by keeping abreast of the times with regard to new and efficient mechanized methods by utilizing modern and efficient equipment,

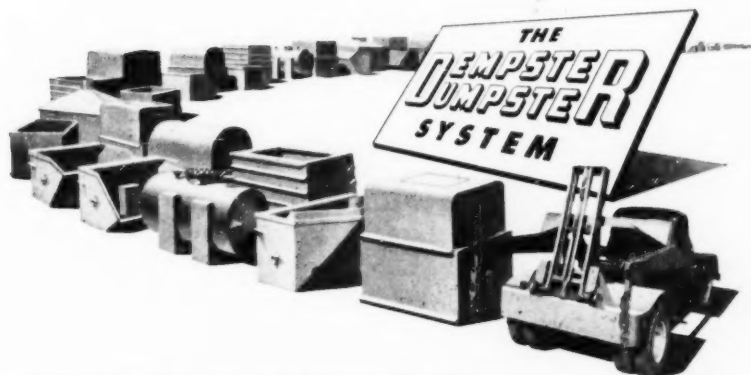


Here's a One-Man Trash and Rubbish Collection System for your City

In the Dempster-Dumpster System of trash and rubbish collection only one man, the driver of the truck-mounted Dempster-Dumpster, is required for operation. The Dempster-Dumpster serves scores of detachable Dempster-Dumpster Containers located at such places as schools, hospitals, market and housing areas, hotels, grocery stores, department stores, restaurants, etc. Each container is loaded by the user. By pre-arranged schedule, the Dempster-Dumpster picks up, hauls to disposal area and empties each container—one after another. Entire operation is handled by hydraulic controls in truck cab, as shown above.

Container capacities range up to 4 times that of conventional dump truck bodies and each container built for trash and rubbish is completely closed—eliminating the health menace of disease carriers such as rats feeding on open and scattered refuse due to unsanitary and inadequate trash cans, barrels, crates, etc.

Without question, the Dempster-Dumpster System is the most sanitary and lowest cost method of bulk rubbish collection ever devised. Write to us for complete information. Manufactured exclusively by Dempster Brothers, Inc.



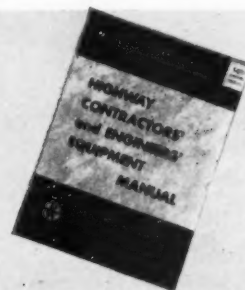
One Truck-Mounted Dempster-Dumpster Handles Scores of Containers . . . All Designs . . . All Sizes

DEMPSTER BROTHERS, 9123 Dempster Building, Knoxville 17, Tennessee

Thousands use our Readers' Service card to keep up to date . . . do you?

Thousands of Engineers and Contractors say

This Manual is Your Memory's Best Friend



A few of the many helpful sections

Just what you need when you design, build and maintain streets and highways

NO one can remember details about all the products, old and new, now available for use in streets and highways. Yet often using the most appropriate piece of equipment or the right material can mean a big difference in efficiency and economy of the job.

That's why, in this one convenient handbook, **PUBLIC WORKS** compiles a complete product report each year on every phase of road building from moving dirt to paving, to snow removal. It states in unbiased terms what types of equipment are best suited for each step in the work. It is complete . . . covers all makes of products . . . is edited now by George E. Martin, the nationally recognized authority.

This wealth of information is available in no other book. It is easy to use, easy to find quickly exactly what you want to know. You don't have to know the name or maker of a product to locate it in the Manual.

Formerly called the Highway Contractors' and Engineers' Equipment Manual, the 1954 edition will be out in January under this new name:

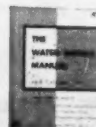
THE STREET AND HIGHWAY MANUAL and Catalog File

Published by **PUBLIC WORKS Magazine**, 310 East 45th St., New York 17, N.Y.

The **HIGHWAY MANUAL**
a complete product source on:

- Basic Equipment
- Saving Money in Moving Dirt
- Equipment for Compaction
- Production of Aggregates
- Bituminous Materials and Construction
- Concrete Construction Equipment
- Drainage and Bridges
- Other Specialized Equipment
- General Highway Maintenance and Snow Removal
- Highway Appurtenances and General Equipment

Use these important time-savers, too:



and by developing special equipment for special needs. In addition, the contractor has much greater freedom than a government agency in disposing of those pieces of machinery that are outmoded, too small in capacity for efficient work, or is no longer needed.

To conclude, we must be fair and admit that some types of maintenance lend themselves to the contract system much more readily than other types. We must stress however, that where a highway department makes a real effort to award those maintenance operations that do lend themselves to contract, the department will find contractors taking a real interest and the contract method highly economical. Our association asks only that the contract system, or the free enterprise method which has made America great, be given a fair chance to prove its worth and that when the awarding agency compares costs that it include all overhead and other costs that should be fairly charged to operations carried out by the agency with its own forces. Finally, the entire economy of the United States is built and based on free and open competition. Why this would apply to new construction and not to those types of road and street maintenance that are applicable to contract is difficult to understand.

J. D. Marshall,
Executive Director,
Associated General
Contractors of America,
Inc., Washington, D. C.

ANALYZING WATER DISTRIBUTION SYSTEMS

I have read with great interest the article by Messrs. Reid and Wolfenson on Electric Calculators Solve Water Distribution Problems in the October issue of PUBLIC WORKS.

This article, although correct, leaves a false impression which I feel should be corrected.

The type of analyzer described by the authors uses linear resistors. Consequently, it arrives at the correct value of head loss by a series of substitutions. Any change of conditions such as load changes or pressure changes, calls for a readjustment of these resistors.

The McIlroy Analyzer, which is mentioned uses a non-linear resistor that represents the loss of head directly without further adjustment. With this analyzer, the pipe system is set up and head losses and flows read directly without adjust-

ing resistors as conditions change.

At the State College of Washington a problem was worked for a consultant which required continuous flow to prevent freezing. It would have been impossible to work this problem on the linear analyzer.

The authors indicate that there are twenty-two analyzers available for rental on a fee basis. There may be this number or more of the linear type. However, of the McIlroy, there are only a few. The first model was built for Dr. McIlroy and is at use at Cornell University. The first commercial analyzer was built for

the State College of Washington and the next for the Midwest Research Institute at Kansas City. There are perhaps three others that were ordered by gas companies and are not, I believe, for rental. These analyzers, of the non-linear type, are all built by the Standard Electric Time Company of Springfield, Massachusetts.

Charles L. Barker,
Professor of Hydraulic
Engineering,
State College of Wash-
ington,
Pullman, Wash.

BE READY FOR SPRING

STOCK UP NOW ON

BUFFALO STEEL "Quick-Set" SIGN POSTS

Now is the time to check your stock and order sign posts. Be prepared for spring... the clean up, fix up season.

Buffalo Steel "Quick-Set" Sign Posts are designed for easy, one-man driving in any type of soil...punched with holes 1" or 2" apart for quick bolting of road signs and route markers...specially coated with long-life, baked-on paint...available in lengths to meet all requirements.

These sign posts are made of heavy-duty, high strength rail steel,—the accepted standard with municipal, county and state engineers.

EMERGENCY ORDERS FILLED NOW ON SNOW FENCE POSTS

Buffalo Steel "Quick-Set" Snow Fence Posts are designed for quick, secure attaching of snow fences. Usable from winter to winter indefinitely.



BUFFALO STEEL DIVISION

H. K. PORTER COMPANY, INC.
OF PITTSBURGH
TONAWANDA, NEW YORK

Now's the time to mail this month's Reader's Service card.

*to meet the
demand...*

FOR *Carlton* PLASTIC PIPE

... Flexibility ... long life ... lightweight ... installation economy ... and outstanding quality have necessitated CARLON'S continuous establishment of new plants.

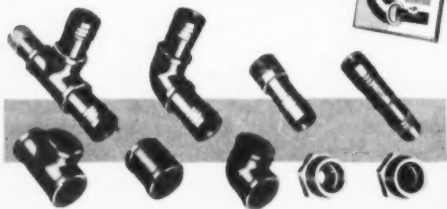
At these strategic points of manufacture, CARLON meets the demands of the hardware industry, homeowners, farmers, and ranchers. New piping for water, sewage, oil and gas keep CARLON active in meeting these demands for the best in plastic pipe.

To keep pace with these needs, CARLON will continue to build its production facilities and create higher standards of quality and efficiency. CARLON does this with a purpose ... to maintain its uncontested leadership as the world's largest producer of plastic pipe.

1361-CP

Buy the Pipe with the Stripe!

Write Today for Free Literature



10300 MEECH AVENUE • CLEVELAND 5, OHIO

IN CANADA,
Micro Plastics Limited
Acton, Ontario

- MAIN PLANT AND GENERAL OFFICES, Cleveland, Ohio
- RESEARCH AND DEVELOPMENT LABORATORIES, Mantua, Ohio
- Upper Sandusky, Ohio
- Asheville, North Carolina
- Denver, Colorado
- Corsicana, Texas
- Klamath Falls, Oregon



**CARLON PRODUCTS
CORPORATION**

Pioneers in Plastic Pipe

It's a fact ... our handy Readers' Service card is the way to get new catalogs.

Traffic-stopper . . . sales-builder! This 100 x 160-foot Butler building gives the Shult Implement Company, El Campo, Texas, a sales "showcase" with permanent, low-cost space for displays, offices, parts and service departments.



This main street beauty is a "showcase" **BUTLER** steel building

Traffic slows as drivers take a second look. Folks on foot pause to browse and stay to buy. The cash registers never seem to stop "talking." Yes, the eye-catching beauty of this modern store—that's a Butler steel building at heart—does more than tickle the owner's vanity. It actually increases store traffic—sales and profits!

You, too, can profit by doing business in a building that's an attractive "showcase" for your merchandise. You don't have to be made of money, either. You can get costly custom-built beauty at mass production prices by combining a regular Butler building with wood, masonry, and glass. Your architect can economically create the individuality that coaxes more customers inside.

Butler buildings provide post-free interiors for shops, stores or offices that are 100 per cent usable. They can be economically heated—insulated for year-around comfort. Insurance rates are low.

You don't need a big bankroll to own a beautiful shop or store, tailored to your individual needs. Write today for full details and the name of your nearby Butler dealer!



BUTLER MANUFACTURING COMPANY

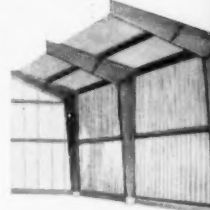
7321 East 13th Street, Kansas City 26, Missouri
921A Sixth Avenue, S. E., Minneapolis 14, Minnesota
1021 Avenue W, Ensley, Birmingham 8, Alabama
Dept. 21A, Richmond, California

Manufacturers of Oil Equipment • Steel Buildings • Farm Equipment • Cleaners Equipment • Special Products
Factories located at Kansas City, Mo. • Birmingham, Ala. • Richmond, Calif. • Galesburg, Ill. • Minneapolis, Minn.

Here is why **BUTLER** is a better buy

Every Foot of Floor Space is Usable

There are no interior posts or columns to waste space and create work-slowng "bottlenecks." Rigid-frame construction also shrinks maintenance costs . . . extends building life.



Fast Erection . . . Easy Expansion

Precision-punched and dimensioned bolt holes speed erection—simplify expansion or dismantling and moving. Galvanized bolts, with Neoprene rubber washers, lock deep-corrugated sheets firmly to the sturdy frame.



Weatherproof Protection

The one-piece, die-formed roof ridge eliminates ridge roll—helps to make the building leakproof and weather-tight.



Triple-Strength Corrugated Sheets

Butler sheeting, with deep-drawn corrugations formed on 12-inch centers, is three times as strong as ordinary corrugated sheets. Overlapping corrugations bolt tightly together for maximum strength and weather protection. Available in steel or aluminum.



Attractive Curved Eaves

The neat, die-formed eaves—which bolt to the roof sheets—add to the appearance of Butler steel buildings . . . increase the strength of the eaves . . . help insure weather-tightness.



Weather-sealed Windows and Base

Where corrugated sheets meet windows or the foundation, they are tightly crimped for a snug fit that keeps out snow, moisture and rodents.



FREE EQUIPMENT DATA to Help Your PUBLIC WORKS PROGRAM

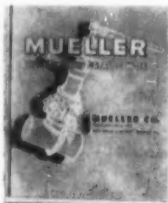
NEW LISTINGS

Here's Help for Laboratory Planning

46. A comprehensive laboratory planning guide which tells the engineer and designer how to obtain the maximum of space economy; utilization of new and present facilities; location of utilities, ventilation and lighting; and functional design is now available from Metalab Equipment Corp., Hicksville, L. I., N. Y. Complete data is furnished on Metalab's line of sectional and interchangeable laboratory equipment, furniture and accessories. 180 pages. Requests for this valuable planning aid must be made on business letterhead.

Helpful Data on Water Works Products

49. A completely new catalog covering the entire line of water distribution and service products offered by the Mueller Company, of Decatur, Ill., is now available to engineers and water works superintendents. The 328-page catalog features an easy-to-use sectional indexing arrangement to facilitate quick reference to any of the hundreds of products listed. A large section of useful engineering information is included. Check the coupon today.



What You Should Know About Concrete Culvert Construction

61. An excellent reference book published by the Portland Cement Association, 33 West Grand Ave., Chicago 10, Ill., presents a discussion of culverts and conduits from the viewpoint of the engineer who must design them. Fundamental considerations; practical methods by which economical drainage structures may be chosen, properly located and correctly designed; procedures which permit shortcut design without extended analysis; and illustrative examples are included in this helpful publication. Write to PCA or check the coupon for your copy.

The engineering information in these helpful catalogs will aid you in your Engineering and Public Works programs. Just circle numbers you want on the coupon, sign and mail. This free Readers' Service is restricted to those actively engaged in the public works field.

Electric Power

Wherever You Need It

75. Electric power for every job—for construction, maintenance and emergencies—is always available for the owner of a convenient Homelite carryable generator. These compact, gasoline engine operated units are made in a variety of sizes to suit every power requirement. Get full details by writing Homelite Corp., Port Chester, N. Y., or check the coupon.

Data on the Ratochlor

Chlorine Dispenser

167. Complete descriptive literature on Ratochlor chlorinators which feature corrosion resistance, safety, dependability and direct, visible flow measurement is available from Fischer & Porter Co., Hatboro, Pa. Details of operation, applications and full engineering data are furnished. Write today or check the coupon for latest information.

How Soluble Silicates

Help in Water Treatment

190. Raw and waste water treatment with soluble silicates is covered in an informative 12-page bulletin, No. 52-19, issued by Philadelphia Quartz Co., Philadelphia 6, Pa. The improvement of coagulation which results in longer filter runs, meets special conditions, and saves chemical costs is fully discussed; instructions are given for the preparation of activated silica sols; and test procedures are outlined. Get this helpful information by checking the coupon.

How "NoStrip" Gives Better Results

In Bituminous Paving

195. An attractive bulletin which describes the properties of "NoStrip", an additive which produces a strong bond between bituminous materials and mineral aggregates,

and resists stripping in the presence of water, has been issued by Maguire Industries, Inc., 182-27 Liberty Ave., Jamaica 33, N. Y. Helpful data on applications, blending methods and results of tests under many conditions are included. Check the coupon for your copy.

Design Data on the Solids Contact Reactor

66. Full information on the Solids Contact Reactor for clarifying and/or lime softening of water has been published by the Cochran Corp., Philadelphia 32, Pa. Eight basic requirements for sound design, details on round and square vertical-shaft units and rectangular horizontal-shaft units are included. To get your copy of this publication, No. 5001-A, just check the coupon.

Data Offered on

Compression Pipe Couplings

111. A new descriptive folder which explains the use of compression couplings on cast-iron, steel and asbestos-cement pipe—threaded or mechanical joint—is now available from Morris Coupling and Clamp Co., Dept. K-39, Ellwood City, Pa. Applications, the simple installation procedure, size, weight and price data are included in Folder No. 102. Check the coupon for your copy.

The ABC of Large

A-C Motor Control

140. A special 36-page issue of the "E-M Synchronizer" presents in an easily understood manner basic facts helpful in the proper selection and application of controls for large A-C motors. A convenient reference for designers and engineers, this booklet contains more than 60 illustrations which are explained and discussed in the accompanying text. Get E-M Synchronizer No. 39 from Electric Machinery Mfg. Co., Minneapolis 13, Minn., by checking the coupon.

12-53

USE THIS COUPON to get detailed information

on products and materials mentioned in this issue.

Circle numbers below and mail today.

Booklets from pages 32 to 48:

20 21 24 25 26 29 33 34 36 38
40 44 46 48 49 61 63 65 66 67
75 80 81 84 88 93 94 97 98 109
110 111 112 124 126 140 141 143 145 146
148 150 157 158 160 163 166 167 168 169
171 173 174 177 178 180 181 182 186 187

190 191 195 200 204 207 209 211 213 214
216 222 224 228 231 232 239 246 252 256
258 259 260 263 264 265 267 271 273 278
280 281 289 291 293 296 297 298 299 303
304 307 317 325 333 335 336 377

New Products, pages 127 to 131:

12-1 12-2 12-3 12-4 12-5 12-6 12-7 12-8
12-9



FOR MORE LISTINGS
SEE PAGES 34 TO 48

Need Data on

Swimming Pool Equipment?

180. Every type of swimming pool equipment—boards, ladders, slides, safety equipment and related accessories—fully described and illustrated in attractive folder issued by American Playground Device Co., Anderson, Ind. All units feature modern design and superior construction to give lifetime service. Check the coupon for this attractive folder.

What You Should Know About Hypochlorination

265. "Hypochlorination of Water" is a 48-page publication discussing chlorination theory, practice and equipment; control of algae and tastes and odors; and laboratory testing. Available from Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md., you can obtain a copy by writing to the manufacturer or checking the coupon.

Name

Occupation

Street

City State

NOT GOOD AFTER JAN. 31, 1954

MAIL THIS CARD NOW



Hydrocrane cleaning out brush at a parkway ravine. Boom reaches out for extra passes — without moving crane an inch!

BUCYRUS-ERIE HYDROCRANE

**six
ways
better
for
so many
park
jobs**

Only the Bucyrus-Erie Hydrocrane can offer you this combination of time-saving, cost-cutting features:

1. **"Reach-ability"** — Boom is equipped with 8 ft. hydraulically telescoping section that reaches into windows and doorways . . . across fences, flower beds, shrubbery . . . without moving crane an inch.
2. **Maneuverability** — Extremely short tail swing (about 4½ ft.), low overall height plus boom telescope permit maneuvering the Hydrocrane in close quarters that stop other outfits cold.
3. **Stability** — Four husky outriggers extend and retract hydraulically in seconds — permit levelling crane from operator's station . . . give Hydrocrane exceptional lifting capacity.
4. **Mobility** — Zips along open highways at speeds up to 50 mph, maneuvers in traffic easy as an auto.
5. **"Control-ability"** — Fully hydraulic, for precision control. Simple hand levers only — no foot brakes. Unskilled men have learned to run it in a few hours.
6. **Convertibility** — Crane has actually been converted to Hydrohoe front end *by one man in less than one hour!* On trenching, telescoping boom cuts lost time on move-ups by 40 percent.

PARK-PROVED IN ALL THESE JOBS

Setting stone slabs
Replanting trees
Excavating for gas lines
Cleaning sunken gardens
Laying pipe
Setting flag poles
Removing trash
Grading around buildings
Snow removal
Building ponds and dams
Stockpiling material

Get the full story on the ¾-yd. Hydrocrane with its many attachments.

SEND COUPON TODAY . . .



Here the Hydrohoe starts a trench cut. Available with either 12- or 18-in. dipper — equipped with hydraulic ejector that kicks dirt out.

**BUCYRUS
ERIE**

BUCYRUS-ERIE COMPANY • SOUTH MILWAUKEE, WIS.

BUCYRUS-ERIE COMPANY South Milwaukee, Wisconsin

Gentlemen: ☐ Please send me Hydrocrane literature.
☐ Please send me Hydrohoe literature.

Name.....

Title.....

Address.....

City..... State.....

19H53

Need more facts about advertised products? Mail your Readers' Service card now.

NEW LISTINGS (cont.)

Helpful Data on
Grandstands and Bleachers

204. Planning grandstands or bleachers? Get data on Snyder units—portable, sectional or permanent—featuring steel construction, safe seating, low maintenance and durability. Full description, table of seating capacity and specifications in folder available from Snyder Tank Corp., Box 14, Buffalo 5, N. Y. Check the coupon.

Power Leaf Sweeper
Grinds Leaves Into Mulch

260. Be sure to investigate the "Mulch-Vac" leaf sweeper, a self-propelled unit which picks up leaves and turns them into a finely ground mulch which may be discharged elsewhere. Fine for paper removal too. Accessories equip unit for mowing and snow removal. Full data in folder from Atwater-Strong Co., Atwater, Ohio. Check the coupon.

STREETS AND HIGHWAYS

8 Reasons Why You Should
Check the Jaeger Loader

207. In a profusely illustrated 16-page catalog devoted to the applications and special design features of the Jaeger "Load-Plus" tractor-loader unit, eight good reasons listed to back up the claim that this machine out-produces any other loader of its size. These include load capacity, balance, reach, maneuverability, automatic power adjustment by torque converter, instant reversal, multiple speed and ease of control. Check them all by getting a copy of Catalog L100-3. Check the coupon today. Jaeger Machine Co., 400 Dublin Ave., Columbus 15, Ohio.

Levels Sidewalks and Curbs
Quickly and Easily

29. How the Mud-Jack Method for raising concrete curb, gutter, walks and streets solves problems of that kind quickly and economically without the usual cost of time-consuming reconstruction activities—a bulletin by Koehring Company, 3026 W. Concordia Ave., Milwaukee 16, Wis. Check the coupon.

Get Data Now On This
Catch Basin Cleaner

34. Simple powerful pneumatic bucket is featured by Netco Catch Basin Cleaner. Folder 33A gives details and illustrates operation of complete self powered truck mounted unit. Netco Div., Clark-Wilcox Co., 118 Western Ave., Boston 34, Mass.

How to Save Time on
Curb and Gutter Work

143. Every type of curb and gutter work is illustrated in the 12-page Heltzel catalog on steel forms for building concrete curbs, gutters and sidewalks. Time-saving setups show how to speed up the job and save money. Get your copy from Heltzel Steel Form & Iron Co., Dept. PW, Warren, Ohio.

Portable Compound Pots
With Bottled Gas Burners

146. For added convenience, Aeroil portable compound pots and lead melting furnaces are offered with bottled gas burners as well as kerosene burners. Get data on melting pots and kettles for all types of jointing materials from Aeroil Products Co., 19 Wesley St., So. Hackensack, N. J. Check the coupon.

Black-Top Paver
Offers Many Advantages

150. The flexible Adnun Black Top Paver lays any asphalt mix, hot or cold, in widths from 6 ft. to 13 ft. Careful design lowers operating cost and cuts maintenance. Attachments spread stone, cinders or slag. Get full data on this machine by checking coupon. The Foote Co., 1954 State St., Nunda, N. Y.

How Reflective Sheeting
Improves Traffic Signs

157. Get full data on Grotelite reflective sheeting for smooth, brilliant, long-life traffic signs and marking devices from the Grote Mfg. Co., Bellevue, Ky. Use the handy card or coupon today.

Portable Hot Asphalt
Paving Repair Unit

171. Maximum economy in paving maintenance and repair is claimed for the compact "Patchmobile" which has a rotary tube continuous dryer, batching hopper for accurate proportioning, twin hot asphalt tanks, heat jacketed pugmill, tool heaters and hand spray bar. Check all these features by getting form 210 from Wylie Mfg. Co., 416 S. W. 23rd, Oklahoma City, Okla. Use the coupon.

Get Full Data On
Aggregate Spreaders

231. Accurate control for spreading crushed rock, chips, sand or ice control materials is featured by all models of Highway Equipment Co. materials spreaders. Data on both trailer and tailboard types available by checking the coupon. Highway Equipment Co., 630 D. Ave., Cedar Rapids, Iowa.

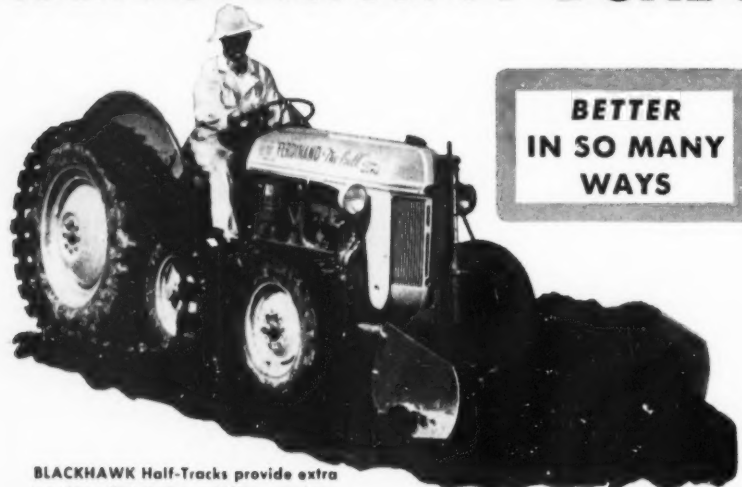
"Quick-Set" Posts for
Signs and Snow Fence

333. For quick, easy driving in any type of soil, be sure to check Buffalo Steel "Quick-Set" sign posts, available in any length you need and ready-punched for fast installation of signs and snow fence. Get full data from Buffalo Steel Div., H. K. Porter Co., Inc., Tonawanda, N. Y. Just check the coupon.

Trucks for Long
Municipal Service

336. The Oshkosh line of 4 and 6-wheel drive trucks, built to give long, dependable service in and off the highway work is described in several handsome bulletins. Get your copies now to check the model best suited to your needs. Use the handy coupon or write Oshkosh Motor Truck, Inc., Oshkosh, Wis.

BLACKHAWK DUAL-ACTION DOZER



BLACKHAWK Half-Tracks provide extra traction, flotation, stability; combine with Dual-Action Dozer for low cost, highly efficient dirt and snow moving equipment.

**BETTER
FOR SO MANY
JOBS**

Backfilling—Removing Top Soil—Leveling—Landscaping—Terracing—Grading—Cleaning Ditches—Excavating—Snow Clearance—Light Road Maintenance

- ✓ Accurately controlled hydraulic down pressure and lift. Cuts into hard soils, frozen ground.
- ✓ Blade may be angled in 5 positions. Use as bulldozer or angledozer.
- ✓ Conveniently located frame tilting device tilts blade to left or right.
- ✓ Blade lifts to height of 18". Sufficient clearance for passing through ditches, over curbs, or down steep banks.
- ✓ Accessories include adjustable side plates and skid shoes to make soil peeling easy and prevent gouging. Blade extension, spring kit and skid shoes convert 6' blade to snow plow.

ARPS
CORPORATION

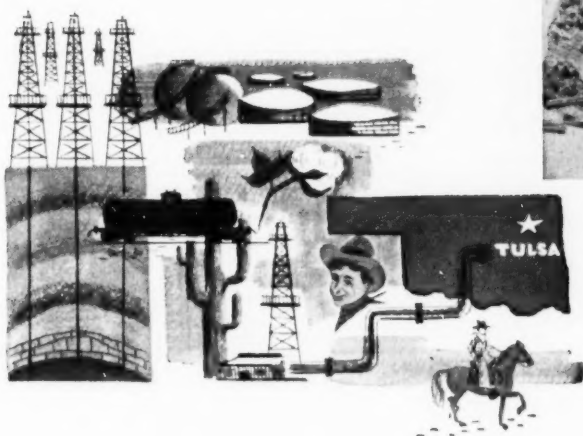
Dept. P.W.

NEW HOLSTEIN, WIS.

**PRODUCTS FOR BETTER FARMS,
BETTER INDUSTRIES SINCE 1920**

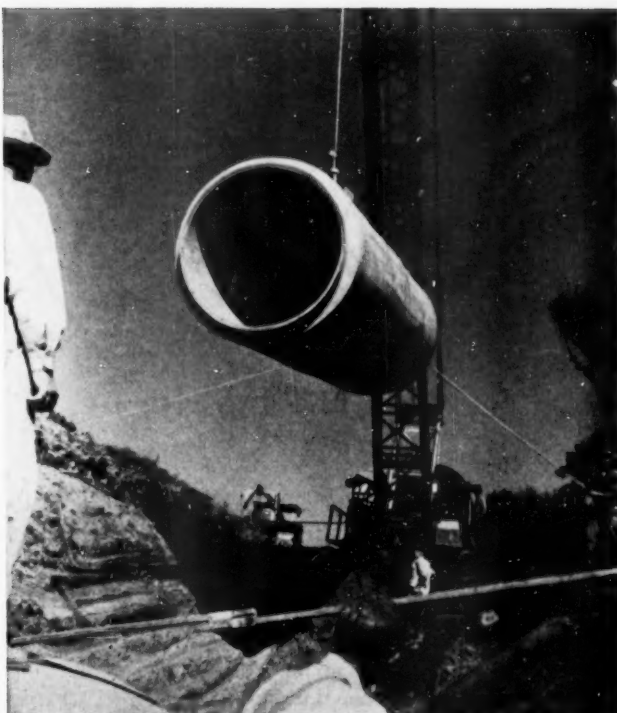
Now's the time to mail this month's Reader's Service card.

Tulsa Prefers Concrete Pressure Pipe



In 1923 when Tulsa reached out to Spavinaw Creek for pure, spring-fed water it selected concrete pressure pipe for the flow line. Fifty-two miles of 54- and 60-inch concrete pressure pipe were installed to carry a maximum of 25 mgd.

Twenty-eight years later Tulsa's phenomenal growth necessitated increasing its water



supply, and the city again chose concrete pressure pipe. The new line, completed last year, using 66- and 72-inch pipe, parallels the original installation boosting Tulsa's total pipeline capacity to 63 mgd.

The confidence Tulsa engineers have in concrete pressure pipe is evidenced by the fact that it was selected a second time for the city's water supply system. The original installation had proven that concrete pressure pipe is efficient, economical, and lasting.

If your city is planning additional water lines, or replacements for old lines, be sure to investigate the distinct advantages of concrete pressure pipe.

Water for Generations to come

Concrete
PRESSURE
Pipe

**AMERICAN CONCRETE
PRESSURE PIPE
ASSOCIATION**

228 North LaSalle Street
Chicago 1, Illinois

Get full details of this month's products... mail your Readers' Service card today.

To order these helpful booklets check the coupon on page 32.

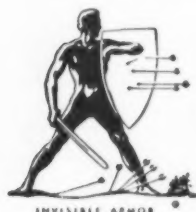
KEEPING PACE



The steady growth of inland marine insurance throughout the country is evidence of its versatility. For example, insurance can be secured for retailers' goods shipped on land, by sea, and in the air; for manufacturers' merchandise consigned to various sections of the country; for contractors' equipment and mobile agricultural machinery wherever it may be. But these are only a few of the things that need inland marine protection, because anything that is moved from one place to another — on land, by sea, and in the air — is exposed to the same hazards to which stationary objects are exposed *plus* the dangers inherent in transportation. Only inland marine insurance provides the necessary safeguards.

In 1940, the NATIONAL SURETY MARINE INSURANCE CORPORATION was founded to fill the need for a larger market in the rapidly expanding inland marine insurance field. Since that time, National Surety Marine has kept pace with the nation-wide development, because it seeks always to tailor this functional coverage to the specific needs of each insured.

Has YOUR insurance program kept pace with the requirements of YOUR business? We invite your inquiries.



YOUR INVISIBLE ARMOR IS A NATIONAL SURETY MARINE POLICY

NATIONAL SURETY MARINE

INSURANCE CORPORATION, 4 Albany St., New York

National Surety Marine Insurance Corporation
4 Albany Street, New York 6, New York

Gentlemen:

I am interested in learning about: Transportation Insurance _____ Contractors' Equipment Insurance _____ Motor Truck Cargo Insurance _____ Other _____

Name _____

Address _____

City _____ Zone _____ State _____

My agent or broker is _____ Address _____

(This information will be forwarded to you through your agent or broker.)

Get full details of this month's products... mail your Readers' Service card today.

Portable Melting Furnace For Rubberized Joint Sealers

213. The Hauck double jacketed melting furnace uses L-P gas as fuel and a high flash point oil for heat transfer to assure close temperature control when melting rubberized joint sealers of all types. All details on this 16-gallon capacity unit are furnished in Bulletin 1081. Check coupon for your copy. Hauck Mfg. Co., 124 10th St., Brooklyn 15, N. Y.

Give Full Protection To Treated Poles and Timbers

267. Bolt holes in treated poles and timbers used for guard rails and structures can easily be the first point of decay. Now you can assure maximum life by using the Greenlee Bolt Hole Treater, a simple device that forces preservative into the wood cells. Bulletin 13-15 gives the details. Greenlee Bros. & Co., Rockford, Ill.

Latest Data on Rubber Roads

296. A report covering all developments to date on the use of natural rubber in road surfacing of asphalt highways has been issued by the Natural Rubber Bureau, 1631 K St., N. W., Washington 6, D. C. Get your copy of this 52-page booklet which includes new data on research and full reports on test roads in many states. Use the handy coupon.

Use Hot Patch Material On All Maintenance Jobs

297. With the Barber-Greene Mixall you can get hot patch material wherever and whenever you need it for all maintenance jobs. Send for new 8-page bulletin that gives full information on this small, highly portable unit that turns out all types of bituminous patch material in any quantity you need. Write Barber-Greene Co., Aurora, Ill., or use the coupon.

Hot or Cold Patching Mixtures Prepared on the Job

304. By preparing your patching mixtures, hot or cold, right on the job, you can use them immediately with a minimum of handling. Get full data on the McConnaughay Model HTD "Multi-Pug" Asphalt Mixer for fast, easy and economical repair of patch materials. Write F. McConnaughay, Lafayette, Ind., or use the coupon.

What A Road Roller Should Give You

325. Many engineering design features that make Buffalo-Springfield rollers the answer to your needs are described in an attractive bulletin covering the C-Model Two-Axle Tandems of Buffalo-Springfield Roller Co., Springfield, Ohio. Included are details on open gridwork for better operator visibility, increased ground clearance and bevel gear drive. Investigate these and many other features listed in Form No. S 61-53. Check the coupon.

CONSTRUCTION EQUIPMENT AND MATERIALS

What You Should Know About Air-Placed Concrete

67. For a detailed explanation of the principle of "gunned" or "air placed" concrete and description of the improved Model 750 and 1250 Bondactors, be sure to get your copy of Form 553 from Air Placement Equipment Co., 1011 W. 24th St., Kansas City 8, Mo. Check the coupon today.

Be Sure to Check Your Tractor Shovel Needs

94. A comprehensive 16-page catalog now available from Frank G. Hough Co., 761 Seventh St., Libertyville, Ill., shows how cities, counties, contractors and others use the Model HR four-wheel drive Payloader on earth and material handling jobs. Be sure to check the ways you could use this machine. Get Form No. 225 by checking the coupon.



Barber-Greene

B-G 840 Paving Plant, showing use of bulkhead feed with two-gate feeder for proportioning sand and gravel. 2, 3 or 4 aggregates may be blended in this manner.



**FOR NEW CONSTRUCTION...
RESURFACING...
MAINTENANCE...**

PRACTICAL... PROFITABLE

UP TO 40 T. P. H.

The capacity range of this B-G Paving Plant has proved to be the most practical for a broad range of users. Output is high enough to supply materials for average-sized new construction and resurfacing jobs—investment is low enough to assure profitable operation at minimum capacities, or for intermittent operation.

ALL TYPES OF MIXES

Bituminous mixes of all types are produced at lowest cost with this B-G Plant. This includes the full range—all temperatures, all gradations and all binders. For "high-type" mixes, the aggregates are blended at the feeding end. Quality and uniformity are consistently high.

TRULY PORTABLE

Each basic unit of this plant—Mixer and Dryer-Dust Collector—is mounted complete on its own trailer-type pneumatic-tired chassis. Built-in hot and cold elevators and dryer stack fold down for transport. There is a minimum of dismantling—the plant can be moved and readied for work in new locations in a few hours' time.

EASIEST TO ERECT

No special erection equipment is needed to set up a B-G Paving Plant. No excavation or footings required. Units are spotted in place by truck, adjustable jacklegs are lowered to ground level, and the plant is ready for operation once the required auxiliary equipment is in place.

LOW-COST MAINTENANCE

The B-G Model 840 Paving Plant is easy to maintain. All moving parts are quickly accessible for inspection and adjustment. B-G Distributors offer fast emergency parts service, and are staffed with factory-trained experts to help you keep your B-G Paving Plant at top operating efficiency.

AUTOMATIC PROPORTIONING

Simple to understand and to operate, the B-G Paving Plant eliminates the human element in producing a consistently uniform mix. Once the bitumen and aggregate proportions have been set, they cannot vary as the positive displacement pump and aggregate apron feeder are positively interlocked. Proportioning is continuous, automatic and accurate.

315A-6

see your **B-G distributor** ...or write
Barber-Greene Company, Aurora, Illinois, U. S. A.

"Encyclopedia" on Bulldozers

97. Every size and style of bulldozer made by Caterpillar Tractor Co., Peoria 8, Ill. is shown in a 36-page booklet, Form 30461. Cutaway views showing details, important components of hydraulic and cable controls, attachments such as brush, root and rock rakes, treedozers and stumpers are also included. Get this interesting publication by checking the coupon.

Have You Investigated Aluminum Gratings?

200. Aluminum gratings for walkways, bridge decking, and stair treads save weight, resist corrosion and are easily handled. Get complete design data, including safe load tables, standard panel widths and weights, from Irving Subway Grating Co., 50-53 27th St., Long Island City 1, N. Y. Just check the handy coupon.

Trenching Made Easy With Hydraulic Dragshovel

216. The Bucyrus-Erie "Hydro-Hoe", a completely hydraulic dragshovel has two separate digging actions to dig a level, scallop-free trench and greatly reduce hand trimming. Be sure to investigate this rugged, easily operated machine. For details write Bucyrus-Erie, Hydrocrane Div., So. Milwaukee, Wis., or check the handy coupon.

Surveying Instruments— Basic Tools for the Engineer

228. Be sure you get Bulletin 1052 of David White Co. when you need transits, levels and other top quality surveyors gear. A full line of surveying instruments and accessories is described in their 42-page catalog. Get your copy by checking the coupon or write to David White Co., 315 W. Court St., Milwaukee 12, Wis.

Booklet Helps Design of Custom-Engineered Steel Buildings

110. Custom-engineered Butler steel buildings are available in every size, type and de-

sign to meet your building needs. In a helpful 32-page booklet you will find details on several basic designs and an unlimited variety of door, window and interior treatments; answers to your questions on construction and erection; and many illustrations of typical uses. Use the coupon or write to Butler Mfg. Co., Kansas City, Mo.

Manual on Retaining Wall Design

160. Embankment stabilization with Armco Bin-Type Retaining Walls is discussed in a 16-page illustrated booklet offered by Armco Drainage and Metal Products, Inc., Middletown, Ohio. Included are case histories which show embankments along highways, lakes, streams and city streets. Technical data covers selection of design and units required for various sections, curves and grades. Use the handy coupon.

For prompt catalog service al- ways use the PUBLIC WORKS reply card or coupon.

Choosing Trucks For Municipal Service

264. For all municipal services, trucks are needed that are high in efficiency and economy. Be sure to investigate the White 3000, engineered for high performance. Full detail on White Super Power trucks from the White Motor Company, Cleveland 1, Ohio.

The Loader That Digs Like a Power Shovel

317. The power crowder-arm of the Lessmann loader gives you power shovel advantages in this tractor-mounted unit, and enables you to fill the bucket in tough digging without spinning the wheels. Check the coupon for all the details on this rugged, heavy-duty unit. Lessmann Mfg. Co., Des Moines 4, Iowa.

SNOW AND ICE CONTROL

Uniform Salt and Cinder Spreading at All Speeds

93. Be sure to investigate the hydraulically operated ground drive offered by Baughman to give you the advantages of two drive speeds and uniform distribution of material regardless of truck speed, but without the need for power takeoff or transmission. Full data on this and many other features in Form A-380. Baughman Mfg. Co., Jerseyville, Ill.

Uniform Salt Spreading Saves Material

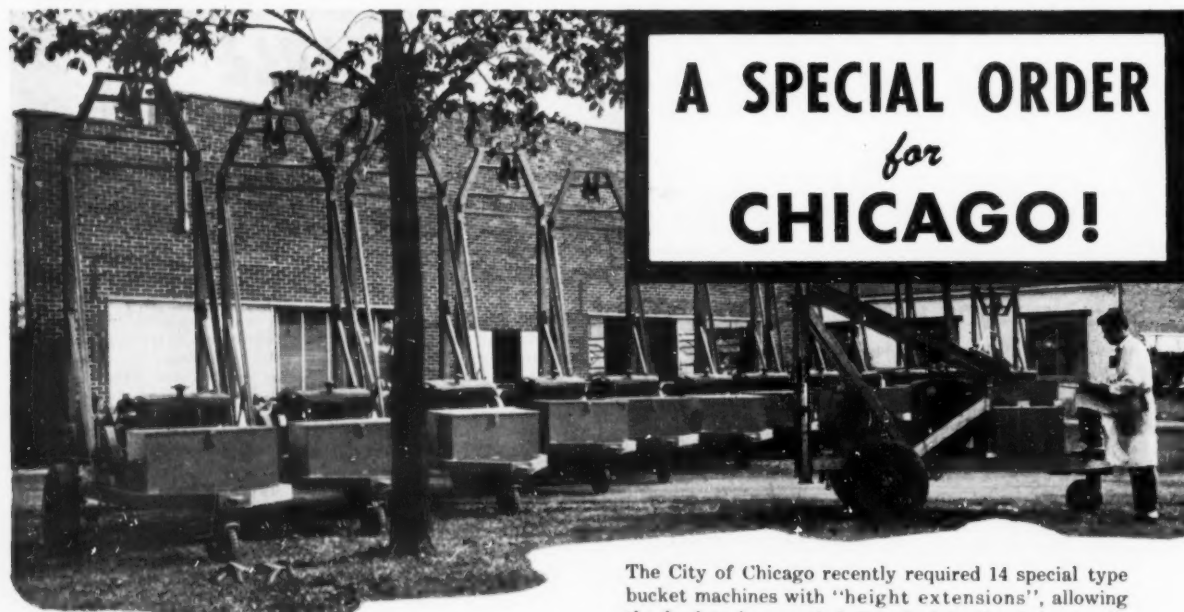
145. The wide, thin pattern provided by Tarco "Scotchman" spreaders avoids salt waste, saves time and labor. Get Folder BL for full details on this spreader and table of material application rates. Use coupon or write Tarrant Mfg. Co., Dept. PW, Saratoga Springs, N. Y.

End Dangerous Ice Hazards

256. Many progressive municipalities use rock salt as standard practice for prevention of ice hazards on streets and highways. Get full data on Sterling "Auger-Action" Rock Salt and suggestions on storage methods from International Salt Co., Scranton, Pa. Check the coupon today.

Keep Batteries in Peak Condition

337. No more battery troubles on slow-moving trucks and other equipment that fail to keep up the charge with conventional DC generators. The Leece-Neville AC-DC generating system is easy to install, needs minimum maintenance and supplies all the power you need. Get full details by checking the coupon. Leece-Neville Co., 5109 Hamilton St., Cleveland, Ohio.



A SPECIAL ORDER for CHICAGO!

Flexible SALES CORPORATION
3786 DURANGO AVE., LOS ANGELES 34, CALIF.
(DISTRIBUTORS IN PRINCIPAL CITIES)

The City of Chicago recently required 14 special type bucket machines with "height extensions", allowing the load to be emptied directly into the dump truck. "Flexibles" was its choice. Pictured above are these "made-to-order" machines just prior to leaving the Flexible plant in Lima, Ohio. We have, or can "tailor", equipment required to meet your city's special needs. Write for FREE CATALOG.

AMERICA'S LARGEST MANUFACTURER OF PIPE CLEANING TOOLS AND EQUIPMENT

Need more facts about advertised products? Mail your Readers' Service card now.



Two major forward steps were taken last spring in Pennsylvania's Clean Streams Program. These new Dorr-equipped treatment plants at Bethlehem and Easton went into operation to play an important part in abating pollution of the Lehigh and Delaware Rivers. Biofiltration and Multidigestion were selected as the most efficient combination at both plants. If you don't already have Bulletin No. 6041, Dorr Equipment and Methods for Modern Sewage Treatment, write for a free copy today. The Dorr Company, Stamford, Conn. In Canada: 26 St. Clair Avenue East, Toronto 5.



Bethlehem, Pa.

Design capacity is 12.5 MGD using the single-stage Biofiltration flowsheet. Dorr equipment includes two 18' sq. Detritors, four 135' dia. S-7 Clarifiers, four 120' Distributors and two 65' dia. Multidigestion Systems.

Consulting Engineers: Morris Knowles, Inc., Pittsburgh, Pa.

Easton, Pa.

Design capacity is 5.0 MGD and either single or two-stage Biofiltration can be used. Dorr equipment includes one 18' sq. Detritor, four 100' dia. S-7 Clarifiers, two 160' Distributors and a 65' dia. Multidigestion System.

Co-Consultants: Glace & Glace, Harrisburg, Pa. and Whitman, Requardt & Associates, Baltimore, Md.



Better tools TODAY to meet tomorrow's demand

DORR

WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT

THE DORR COMPANY • ENGINEERS • STAMFORD, CONN.

Offices, Associated Companies or Representatives in principal cities of the world.

Now's the time to mail this month's Reader's Service card.

How Motor Graders Beat the Snow Problem

367. The power and directional control of Austin-Western Four-Wheel Drive, Four-Wheel Steer Power Graders are a combination that beats the toughest plowing combination. Get data on plow and snow loader attachments for graders from Austin-Western Co., Aurora, Ill. Check the coupon.

Snow Plows for Every Street and Highway Need

335. For details on the full line of Frink Sno-Plows, including the new taper-type reversible plow with hydraulic roll-over control, reversible trip-blade plows, Vee plows and all accessories, check the coupon today. Frink Sno-Plows, Inc., Clayton, N. Y.

WATER WORKS

Check List for Proposed Water Supply Lines

24. A convenient folder covering all the requirements for proposed water supply lines has been prepared by Price Brothers Co., 1932 East Monument Ave., Dayton 1, Ohio. Basic questions about the materials you plan to use are arranged for easy evaluation of each type of pipe material. Get a copy of this useful folder by checking the coupon.

Methods of

Chlorinator Control

98. Chlorinator control methods include manual, semi-automatic, program, rate, fully automatic proportional and split feed control. To assist the chlorinator user and his engineer or technical adviser in the selection of the control method best suited for each requirement, a publication of Wallace & Tiernan, Inc., describes these methods in detail. You can get a copy of Publication TA-1013-C by checking the coupon.

Data on Cutting-In Valves, Repair Sleeves and Accessories

33. A variety of Clow products for installation and repair of cast iron pipe lines, including the Eddy cutting-in valve and sleeve, split sleeves for pipe repair, test plugs, valve boxes, Strickler pipe cutters and other fittings and accessories are featured in literature available from James B. Clow & Sons, Inc., Box 6600-A, Chicago 80, Ill. Check the coupon.

What You Should Know About Chemical Proportioning Pumps

38. In an attractive new bulletin you will find latest information on the Heavy-Duty Chem-O-Feeder, plus many installation diagrams, construction and operating details, list of chemicals fed and other helpful information on constant rate and flow proportional chemical feeding. Get your copy from Proportioners, Inc., Providence 1, R. I., by checking the coupon.

Technical Data on Fluorides And Other Chemicals

48. Technical data on fluorides and other chemicals will be found in a comprehensive booklet issued by Blockson Chemical Co., Joliet, Ill. This helpful 60-page booklet includes a great deal of general information of value to water works men. Get a copy by checking the coupon.

Useful Design Data On Clarifiers

65. Designers and engineers will find a wealth of helpful information on Dorr Clarifiers for water, sewage and industrial waste treatment in an attractive booklet issued by the Dorr Co., Stamford, Conn. Units for round and square tanks in diameters from 12 to 200 ft. are fully specified and illustrated. Check the coupon for your copy.

Theory and Application Of the Flow Tube

84. Hydraulic formulae, head capacity curves and test data for this primary metering element are given in a technical bulletin, "Theory and Application of the Flow Tube," available from Foster Engineering Co., Union, N. J. Check the coupon for a copy.

Head Loss Data On Plastic Pipe

26. Carlon Products Corp., 10225 Meech Ave., Cleveland 5, Ohio, announces that authoritative data has been compiled on head loss due to friction in Carlon plastic pipe and is available in the form of graphs and charts. The graphs show superior flow characteristics, attributed to the fact that plastic pipe is not "wetted" by water. Send for this data today by using the handy coupon.

Reconditioning Pipe Lines With Cement-Mortar Linings

80. Pipe lines from 4 to 144 inches in diameter can be cement lined in place by the Centrline and Tate Processes. Catalog 9-52-5M describes how this operation gives new pipe line performance for a fraction of the cost of new pipe and shows how the work is done. Check coupon for your copy. Centrline Corporation, 140 Cedar St., New York 6, N. Y.

Rapid Sand and Pressure Filter Data

109. Rapid sand filters. A complete line of vertical and horizontal pressure filters, wooden gravity filters, and filter tables and other equipment. For engineering data, write Robert-Filter Manufacturing Co., 640 Columbia Ave., Darby, Pa.

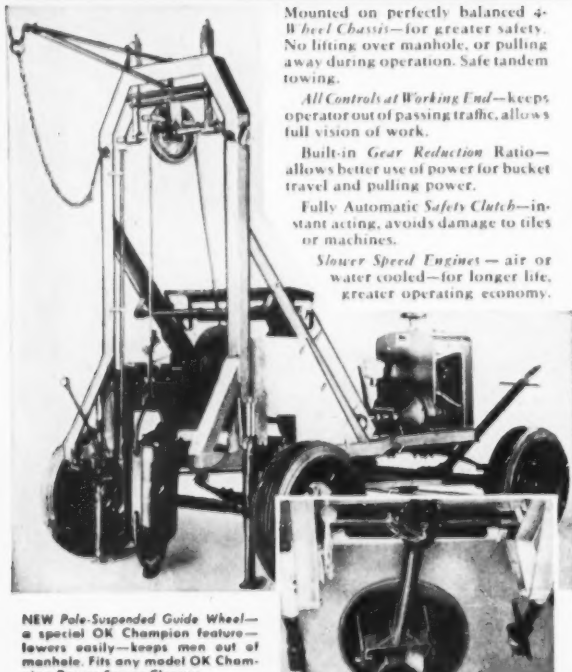
Specs for Gate Valves

112. Rigidly inspected gate valves for pressures up to 175 lbs. by R. D. Wood Co. Sizes 2" to 30"; for any standard type joint. R. D. Wood Co., Public Ledger Bldg., Philadelphia 5, Pa.

Faster Pipe Laying With Precast and Threaded Joints

148. McWane 2" cast iron water pipe with threaded joints and precast and bell and spigot pipe are described in folder WM-47. Additional data on 3" to 12" centrifugally cast pipe and fittings in folder WL-47, both issued by McWane Cast Iron Pipe Co., Birmingham 2, Ala.

OK CHAMPION POWER SEWER CLEANERS



NEW Pole-Suspended Guide Wheel—a special OK Champion feature—lowers easily—keeps men out of manhole. Fits any model OK Champion Power Sewer Cleaner.

Mounted on perfectly balanced 4-wheel chassis—for greater safety. No lifting over manhole, or pulling away during operation. Safe tandem towing.

All Controls at Working End—keeps operator out of passing traffic, allows full vision of work.

Built-in Gear Reduction Ratio—allows better use of power for bucket travel and pulling power.

Fully Automatic Safety Clutch—instant acting, avoids damage to tiles or machines.

Slower Speed Engine—air or water cooled—for longer life, greater operating economy.

Write for latest OK Champion Circular
CHAMPION CORPORATION • 4752 Sheffield Ave. • Hammond, Ind.

the
MODERN
approach



Cast iron pipe centrifugally cast and with mechanical joints is the most efficient and economical means of modern day distribution. Serving the industry with Super de Lavaud cast iron pipe centrifugally cast in modern long lengths with standardized Mechanical Joints, Bell and Spigot or Flanged, with or without centrifugally applied cement lining. Rugged, dependable and economical.

General Sales Offices ANNISTON, ALABAMA

We invite inquiries to our nearest sales office

132 So. Michigan Avenue
Chicago 3, Ill.

350 Fifth Avenue
New York 1, New York

ALABAMA PIPE COMPANY
ANNISTON ALABAMA

It's a fact... our handy Readers' Service card is the way to get new catalogs.

ANOTHER BONDACITOR APPLICATION



Solve Your Street Patching Problems... with the BONDACITOR...

Your Repairs are Done
Better, At Less Cost

Practically any concrete construction or repair job is a "natural" for the BONDACITOR. Sidewalks, curbs, bridges, buildings, settling basins, swimming pools, water lines and sewers can all be quickly and easily repaired. Completely mobile, the BONDACITOR is readily transported from job to job. Patching and other maintenance operations are completed faster — at far less cost than is possible with manual methods. Your two or three-man BONDACITOR crew will easily take care of both major and minor concrete repairs. Investigate this labor and money saving machine for your next job.

3 BONDACITOR Models Available

Model 750. Capacity: $\frac{1}{2}$ — $\frac{3}{4}$ cu. yd. per hr.

Operates with 75 or 105 CFM compressor.

Model 1250-S. Capacity: $\frac{3}{4}$ — $1\frac{1}{2}$ cu. yds.

per hr. Operates with 105 CFM compressor.

Model 1250-L. Capacity: $1\frac{1}{2}$ —3 cu. yds.

per hr. Operates with 210 CFM compressor.

Capacities vary with material being gunned and with specific operating conditions. In addition to concrete, BONDACITORS also efficiently gun many prepared cementitious mixes and refractories. Ideal, too for both wet and dry sandblasting.

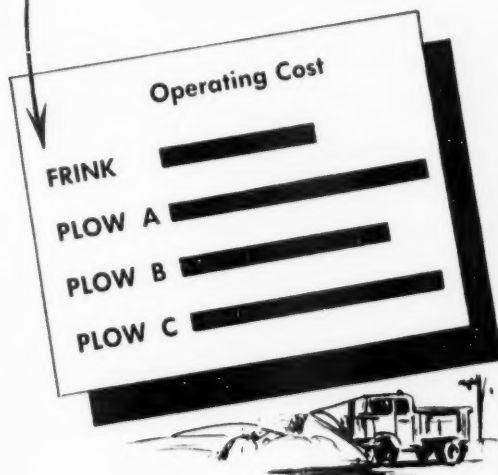
**Write Today For
Complete Details**

State intended use
and materials
to be gunned.

**AIR PLACEMENT
EQUIPMENT COMPANY**
1013 W. 24th St.
Kansas City 8, Mo.

FRINK SNO-PLOWS

**COST LESS
TO OPERATE**



Detailed cost records by a State Highway Department have been kept on the performance of different makes of snow plows used on the same make and model trucks.

In every case where a Frink was used there was less maintenance not only on the Sno-Plows but also on the Frink-equipped trucks themselves. The records show less repairs, less maintenance, and less time in the shop, also trucks with Frink Sno-Plows used less gas and oil.

Frink Sno-Plows do the job better, faster, and at a lower cost.

Frink Reversible Type, One-Way Type, V-Type Sno-Plows and the Frink Roto-Broom are interchangeable on the same truck attachment.

For further information on this Sno-Plow write for catalog to nearest address, Box PW 5312

FRINK SNO-PLOWS

FRINK SNO-PLOWS, INC., CLAYTON, NEW YORK
DAVENPORT-BESLER CORP., DAVENPORT, IOWA
FRINK SNO-PLOWS of CANADA, LTD., TORONTO, ONT.

How to Tap Concrete Pressure Pipe

126. The simple steps required in making a pressure tap in concrete pressure pipe are explained in a booklet issued by Lock Joint Pipe Company. Be sure you know how either large connections or small service outlets may be made economically and without sacrifice of strength. Just check the handy coupon. Lock Joint Pipe Co., Box 269, East Orange, N. J.

How Engineers and Contractors Can Get This Comprehensive Water Control Apparatus Catalog

141. A 250-page catalog showing the full scope of Rodney Hunt water control apparatus is now available for distribution to consulting engineers, contractors and others actively engaged in water control construction work. Hundreds of diagrams, detailed descriptions and specifications show all types of sluice gates and related items, and a special section provides helpful engineering data. Send your request on business letterhead or use the coupon, stating your occupation. Rodney Hunt Machine Co., 7 Water St., Orange, Mass.

Avoid Needless Digging With This Valve Box Locator

165. Convenience and accuracy are key notes of the Aqua Valve Box locator described in a full-color folder offered by Aqua Survey and Instrument Co., 2518 Leslie Ave., Cincinnati 12, Ohio. Cobalt alloy steel dipping needle is factory-set for any geographic location. Periscope type mirror arrangement permits effortless top reading. Get full details by checking the coupon.

Pipe Joint Essentials and Couplings for Every Job

166. Superior pipe joints are tight, flexible, simple, strong and economical. Dresser's handsome 34-page bulletin No. 313 shows how these essentials are met and provides layouts for curves, working pressures and a wealth of other data. Be sure to check this bulletin on the coupon. Dresser Mfg. Div., 59 Fisher Ave., Bradford, Pa.

Now Every Municipality Can Own a Trencher

173. The low cost of the Blackhawk Trench Hog, a tractor-mounted ladder type trencher makes it profitable for many municipalities to own their own trencher. Be sure to investigate this versatile machine which digs trenches to 8 feet deep, 20 inches wide. Illustrated bulletin available from Arps Corp., New Holstein, Wis. Just check the coupon.

All-Electric Floatless Liquid Level Control

174. Description of operating principles and application of B/W controls show the simplicity and many uses of these all-electric floatless devices. Get latest bulletin for engineering data, diagrams of typical installations and details of component parts. Check the coupon or write B/W Controller Corp., Dept. PW, Birmingham, Mich.

Complete Catalog and Reference Data on Valves and Fittings

211. The entire M & H line of valves, fittings and accessories for water works, filtration, sewage disposal and fire protection are illustrated and fully detailed in Catalog 52 issued by M & H Valve & Fittings Co., Anniston, Ala. In addition to complete data on these products, there are many pages devoted to helpful engineering data. Every designer should have a copy. Get yours by checking the coupon.

Porous Media Handbook For Sanitary Engineers

222. A really helpful 56-page booklet just published by the Carborundum Company tells the complete story of the use of porous media in the fields of water and sewage treatment. The major portions are devoted to water filtration and air diffusion for activated sludge treatment. Diagrams show the many installation methods used, and full data is provided for the designing engineer. General data and specification sections complete this valuable reference bulletin. Get Form 3118 by checking coupon or write The Carborundum Co., Refractories Div., Perth Amboy, N. J.

What You Should Know About Meter Setting and Testing Equipment

166. Complete details on all equipment and proper methods for meter testing and installation are included in an excellent book published by Ford Meter Box Co., Wabash, Ind. All waterworks men concerned with setting and testing of water meters should have a copy of this book. Write for Catalog No. 50.

Locate Mains and Services Without Digging

186. A 16-page booklet tells how to use the Fisher "M-Scope" to locate buried pipes and valves by electronic means. Proper manipulation also determines depth of cover. Battery operated unit is readily carried by one man. Get data from Fisher Research Laboratory, Inc., 1961 University Ave., Palo Alto, Calif.

Get This Helpful Data On Valve Boxes

187. Full details on service, roadway and valve boxes, meter boxes, frames and covers are included in Bulletin 2000 issued by Alabama Pipe Co., Anniston, Ala. All standard sizes are listed, together with prices, and instructions are furnished for handling special designs. Check the coupon for your free copy.

Efficient Underdrains for Rapid Sand Filters

239. Be sure you have engineering data on vitrified clay underdrains, efficiently designed for filtering and backwashing. Check the coupon or write F. B. Leopold Co., Inc., Dept. PW, 2413 W. Carlson St., Pittsburgh 4, Pa.

Standard Specifications for C. I. Pipe and Fittings

278. Standard dimensions for cast iron water pipe and special castings are available in a convenient booklet offered with the commitments of U. S. Pipe and Foundry Co., Birmingham 2, Ala. Get your copy by checking the coupon.



*All Electric
Floatless...*

LIQUID LEVEL CONTROLS

Control variations in levels from 1/4" upward. Remote control if desired — any distance. Controls unaffected by acids, caustics, pressures or temperatures.

Since 1933 B/W Controls have provided positive, dependable, economical liquid level control. No floats! No vacuum tubes! No moving parts in liquid.

WRITE FOR CATALOG
**B/W CONTROLLER
CORPORATION**

2224 E. Maple Road
Birmingham, Michigan

**FIRST and FOREMOST
IN THE FLOATLESS
CONTROL FIELD**



SMOOTH
SS
SURFACE

REFLECTIVE SHEETING

**GREATER
SAFETY**

LONGER RANGE

**DURABILITY
ECONOMY**

Write for
complete
description,
samples and
prices.

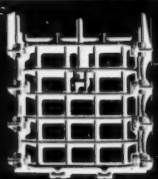
THE **Grote** MFG. CO.
BELLEVUE, KY.
(Opposite Cincinnati)

This highly reflective, smooth surface flexible sheeting makes a smashing, attention-compelling sign with greater day and night value. The smooth, self-cleaning surface can be screened, sprayed or brushed. It is easy to apply and makes the best long life signs and marking devices.



FOR SLUICE GATES
large or small

**SPECIFY
RODNEY HUNT**



Rodney Hunt cast iron bronze-mounted sluice gates are used throughout this modern sewage treatment plant at Bucklin Point, East Providence, R. I. Here, there are Rodney Hunt gates 96 x 96, 84 x 96, 60 x 72, 48 x 72, 36 x 24, 24 x 36, and 24 x 18; wall thimbles are in place for 19 more gates in sizes up to 96 x 120 to be installed as need arises.

There are 2000 combinations of types and sizes of Rodney Hunt standard cast iron bronze-mounted sluice gates, giving engineers a very wide selection of rectangular clear openings up to 120" x 120" or diameters up to 108". Experienced engineering and traditionally good New England skill in our foundry and machine shop assure trouble-free low-cost operation of Rodney Hunt Sluice Gates. We bid competitively and make firm deliveries to meet construction schedules.

FREE
232 page Catalog

A 28-page section gives valuable engineering data on hydraulic problems.
This catalog was prepared for consulting engineers, contractors and others actively engaged in water control. Write on your letterhead for Catalog WCA-952.



Manufacturing Engineers Since 1840

RODNEY HUNT MACHINE CO.
82 Lake Street, Orange, Mass., U.S.A.

Get full details of this month's products... mail your Readers' Service card today.

Attractive Bulletin Features Large Elevated Tanks

252. In a 24-page booklet, "Horton Elevated Steel Tanks of Large Capacity," Chicago Bridge & Iron Co., Chicago 4, Ill., describes the advantages of using large elevated steel tanks to provide gravity pressure in municipal water systems. Detailed information on radial-cone tanks of 500,000 to 3,000,000-gal. capacity and Horton-spheroidal tanks of 1,000,000 to 3,000,000 gal. is included in this really handsome bulletin. Check coupon for your copy.

Does Your Water Works Have Standby Power?

224. Dependable Climax power plants are ready for emergency service to insure fire protection, and can also save power costs by peak load operation. Use the coupon for full data on Climax, 40 to 495 HP, operating on sewage or natural gas, butane or gasoline. Climax Engine & Pump Mfg. Co., 208 So. La Salle St., Chicago 3, Ill.

Complete Booklet on Pipe Line Equipment

246. Equipment for all types of jointing, maintenance and repair jobs on water, gas and sewer lines is described and illustrated in Catalog No. 25 issued by Joseph G. Pollard Co., New Hyde Park, N. Y. Leak detectors, pipe finders, melting kettles, cleaning tools and a full line of hand tools for water and sewer departments, and many other items are included. Be sure to get your copy now. Just check the coupon.

Factors to Consider in Elevated Tank Selection

299. Details on the several different types of elevated steel tanks, including capacity ranges, tank dimensions and other factors to be considered in the selection of elevated tanks for modern water storage, plus discussions of new tanks for old towers and foundations are included in Bulletin 101 of the Pittsburgh-Les Moines Steel Co., Neville Island, Pittsburgh, Pa. Check coupon for your copy.

Are You Ready Now To Make Main Repairs?

214. Broken water mains can quickly be repaired when you have "Skinner-Seal" Split Coupling Clamps on hand. Get Skinner Catalog 41 now—this handsome 40-page book shows how to make every type of pipe repair and covers a complete line of clamps to do the job quickly and easily. Just check the handy coupon for your copy. M. B. Skinner & Co., So. Bend 21, Ind.

Corrosion Protection For Water Works

280. Steel pipe lines, elevated tanks, treatment plant equipment and all other steel structures subject to rust, tuberculation and attack by aggressive soils can be protected by long-lasting Bitumastic enamels. Send for bulletins today so that you can specify the right coating for your job. Use coupon or write Koppers Co., Tar Products Div., Pittsburgh 19, Pa.

Helpful Data On Valve Boxes

291. Bulletin 35 issued by Buffalo Pipe & Foundry Co., Box 55, Sta. B., Buffalo, N. Y., gives full details on adjustable valve boxes, extension boxes and roadway boxes for water and gas. Get your copy by checking the coupon.

All About Centrifugal Pumps

258. Where pumping performance counts you want to check your specifications carefully. Investigate the features of Fairbanks-Morse centrifugals. Use coupon or write to Fairbanks, Morse & Co., Dept. PW, Chicago 5, Ill.

Water Conditioning Data Book Offered To Engineers

259. All engineers and municipal officials concerned with water conditioning will want a copy of the greatly enlarged edition of the popular Permit Data Book prepared by the Permit Co., 330 West 42nd St., New York 36, N. Y. This completely revised book pre-

sents a compilation of 78 tables, all valuable to the engineer. Subjects include hydraulics, impurities in water, reactions and conversions of chemicals used in water treatment, alkalinity relationships and other helpful material.

STREET LIGHTING

Helpful Data On Outdoor Lighting Equipment

43. A complete catalog of standard Union Metal brackets, mast arms and accessory attachments for poles of every type, and including mounting instructions and illustrated construction details is now available from Union Metal Mfg. Co., Canton 5, Ohio. Get this important reference booklet by writing to the company, or check the coupon.

BUSINESS AND ADMINISTRATION

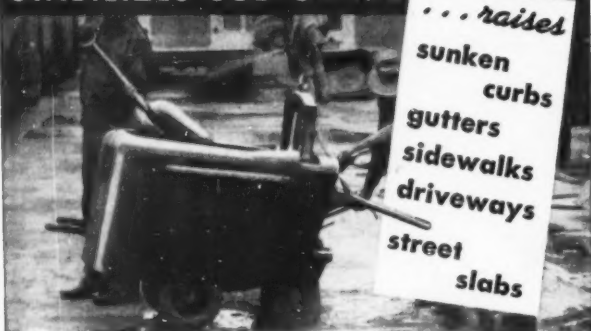
10 Reasons for Blanket Bond Covering Public Employees

289. As a part of their modern bonding program, the National Surety Co. presents 10 reasons for having a Public Employees' Blanket Bond covering your personnel in forms offering greatest protection per premium dollar. Get Form 23163 by checking the coupon. National Surety Corp., 4 Albany St., New York, N. Y.

Two-Way Radio Equipment For All Departments

293. The benefits of two-way radio communication in the uncongested non-interference 450-megacycle range make full information on this subject important to all engineers. Get full data on trouble-free systems from Motorola, Inc., Dept. PW, 4545 Augusta Blvd., Chicago 51, Ill. Just check the coupon.

STABILIZES SUB-GRADE



KOEHRING MUD-JACK®

raised sunken slabs at city bus terminal (above) . . . stabilized sub-grade support under the paved parking area without interrupting traffic. Small holes were drilled through the pavement . . . then, Mud-Jack pumped inexpensive soil-cement slurry into the holes, raised the concrete,

leaving solid, permanent support. Compact, portable as a 2-wheel cart, this No. 10 Mud-Jack is ideal for city work . . . no inconvenience to the public, no detours necessary. Also check the bigger No. 50 Mud-Jack for preventive maintenance and repairs on extensive highway work. Saves time, money and labor.

Send for 20-page engineering hand-book on Mud-Jack method of stabilizing sub-grades.

TO: KOEHRING COMPANY, Milwaukee 16, Wis.

NAME _____

STREET _____

CITY _____

STATE _____

5207 PB

The
NEW
IMPROVED

NETCO CATCH
BASIN
CLEANER
WITH PNEUMATIC CONTROLS



A Necessity For Every Municipality

Easily mounted on any short wheel base truck with 8 ft. in back of the cab, the Netco can be operated continuously, averaging 20 to 30 catch basins a day. The Netco with its two powerful pneumatic buckets (orange peel or clamshell) is simple to operate, has a hoisting capacity up to 1500 lbs., and easily removes all debris through openings as small as 16 inches. Send for our six-page descriptive folder.



NETCO DIVISION
CLARK-WILCOX COMPANY
118 Western Avenue
Boston 34, Massachusetts

1935 • 1953



18 YEARS OF LOW COST WATER PURIFICATION

CHLOR-O-FEEDER FEATURES:

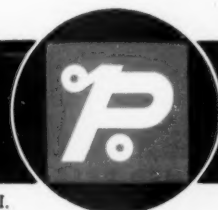
- Low first cost
- Low maintenance
- Interchangeable parts on all models
- Ease of installation and removal
- Packaged unit including all accessories
- Backed by a reliable manufacturing and service organization

In 1935 this %Proportioneers% Heavy Duty Midget Chlor-O-Feeder was installed at the Canobie Lake Recreation Company, Salem Depot, New Hampshire. Here you see it about to be returned to active service after being completely overhauled at the factory. This unit was the second Heavy Duty Midget Chlor-O-Feeder to go into service anywhere in the world — now, because of interchangeability of parts, completely modernized ready for another 18 years of service.

Now let's review the actual expenses involved in this installation. Total cost, including installation, amortization and maintenance, for safeguarding the health of the patrons of the Canobie Lake Park has been less than \$19.00 per year. This is a typical performance record for %Proportioneers% Heavy Duty Midget Chlor-O-Feeder.

Write for Bulletin 1201-1 describing %Proportioneers% Chlor-O-Feeder

% PROPORTIONEERS, INC. %



Consult your telephone directory or write to %PROPORTIONEERS, INC.%, 356 Harris Av., Prov. 1, R. I.

Technical service representatives in principal cities of the United States, Canada, Mexico and other foreign countries.

It's a fact . . . our handy Readers' Service card is the way to get new catalogs.

REFUSE COLLECTION AND DISPOSAL

Increasing the Efficiency of Bulk Rubbish Collection

177. Strategically spotted bulk containers can be handled by one man operating a Dempster-Dumpster equipped truck. Get full details of this cost-saving system of rubbish collection, as used by many cities to increase efficiency and eliminate unsanitary conditions. Write Dempster Brothers, Inc., 952 Dempster Bldg., Knoxville 17, Tenn., or use the handy coupon.

SEWERAGE AND WASTE TREATMENT

Packaged Sewage Treatment— Just Right for Small Places

36. "Packaged" Sewage Treatment Plants specifically developed for small communities—100 to 3,000 population. Write for full description and actual operating data for this type of plant. Chicago Pump Co., 622 Diversey Pkwy., Chicago 14, Ill.

Helpful Design Data For Sewage Ejectors

81. The applications and advantages of pneumatic sewage ejectors are outlined in a new bulletin of the Blackburn Smith Mfg. Co., Inc., Hoboken, N. J. Included are piping diagrams for electrode and float switch controls plus dimensions and layouts for single and duplex systems. Get your copy by checking coupon.

What You Should Know About Trickling Filter Underdrains

20. Specifications for vitrified clay underdrain blocks conforming to ASTM standards, suggestions for layout and construction of trickling filter floors, dimensions of standard blocks, channel covers, angles and other fittings are available from the Trickling Filter Floor Institute, c/o Editor, Public Works, 310 E. 45th St., New York 17, N. Y. Check the coupon and we will forward your request.

Valuable Booklet on Porous Diffuser Plates and Tubes

21. A helpful 20-page booklet published by the Norton Co. is a complete guide for the selection of porous media for installation in activated sludge plants. Full data for the designing engineer is provided by careful detailing of physical characteristics of plates and tubes. Maintenance of porous media also is discussed at some length. For your copy of Form 1246, write the Norton Co., Dept. PW, Worcester 6, Mass., or use the coupon.

How Cities Clean Sewer Lines From Street in One Operation

25. In a helpful 28-page handbook of sewer cleaning methods and equipment the makers of OK Champion sewer cleaners give full details of power and hand operated models. Also included are data on expansion buckets that take dirt from sewer to street in one operation, root cutters and other accessories. Get your copy by checking coupon. Champion Corp., 4752 Sheffield Ave., Hammond, Ind.

Complete Sanitation and Process Equipment Bulletin

40. A complete illustrated bulletin gives detailed information on all "Rex" sanitation and process equipment. 36 pages of engineering data, process descriptions, conversion factors. Get Bulletin 51-83 by checking the coupon. Chain Belt Co., Box 2022, Milwaukee 1, Wis.

Theory of Controlled Digestion With Floating Cover Tanks

88. In an excellent 40-page booklet, an authoritative discussion of digestion theory and practices, including design, operation and economics is presented by the Pacific Flush Tank Co., Chicago 13, Ill. Complete data are given on the use of floating covers, together with details on tank construction, piping and control chambers. Requests for this valuable booklet must be made on business letterhead.

Helpful Data on Sluice Gates

158. In a well-organized 48-page catalog you will find complete engineering and design data on Pekrul sluice gates, headgates, automatic flap gates, lifts and accessories. Numerous models in 6" to 92" sizes are available, and all pertinent data will be found in this helpful booklet. Write Morse Bros. Machinery Co., Denver, Colo., or use the coupon.

Complete Data on Sludge Pumps and Contractors Pumps

178. An easy-to-use reference bulletin covering the full line of Marlow pumps for municipal and industrial wastes includes performance information, specifications and selection data for plunger sludge pumps, mud-hog diaphragm pumps and self-priming centrifugal pumps used on sludges and slurries. Get your copy by writing Dept. PW, Marlow Pumps, Ridgewood, N. J.

Factors in Selecting Chlorine Gas Feeders for Sewage Chlorination

181. A technical data sheet, number 840-137, has been prepared as a guide in the application of chlorine for sewage treatment. The purposes of sewage chlorination, types of chlorination, points of application, control methods, types of feed and feeders and equipment location are discussed. Check the coupon or write to Builders-Providence, Inc., 345 Harris Ave., Providence, R. I.

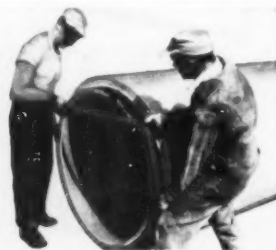
Specify **TYLOX** Flexible Rubber **SEWER PIPE GASKETS**

for joints that speed pipe-laying, cut installation costs, stay tight. Tylox Pipe Joints are:

- ★ ROOTPROOF
- ★ LEAKPROOF
- ★ CORROSION-PROOF

Write for specification data and illustrated case histories.

**HAMILTON KENT
MANUFACTURING COMPANY**
225 Goughler Ave. Kent, Ohio



for **CAST IRON PIPE** CALL OR WRITE

McWANE Cast Iron Pipe Company, Birmingham, Ala.
Pipe sizes 2" thru 12"

Sales Offices
Birmingham 2, Ala., P. O. Box 2601. Phone: 4-3521.
Chicago 1, Ill., 333 North Michigan Avenue. Phone: CE 6-9752.
New York 4, N. Y., 80 Broad Street. Phone: Bowling Green 9-7735.
Kansas City 6, Mo., 1006 Grand Avenue. Phone: Harrison 2492.
Dallas, Texas, 3200 Maple Avenue. Phone: Riverside 5683.

PACIFIC STATES Cast Iron Pipe Co., Provo, Utah
Pipe sizes 2" thru 24"

Sales Offices
Provo, Utah, P. O. Box 18. Phone: 3200.
Denver 2, Colo. 1921 Blake Street. Phone: Main 0697.
Los Angeles 48, Calif., Wilshire Blvd. Phone: Webster 3-9108.
San Francisco 4, Calif., 235 Montgomery Street. Phone: Yukon 6-1421.
Portland 4, Oregon, 501 Portland Trust Bldg. Phone: Al-water 2815.
Salt Lake City, Waterworks Equipment Co. Phone: 4-1971.
Seattle, Wash., Smith Tower Bldg. Phone: Seneca 2680.

1848



M-SCOPE PIPE — LOCATOR

Light Weight Model AB

Only \$149.50

Superior Performance
at Lower Cost

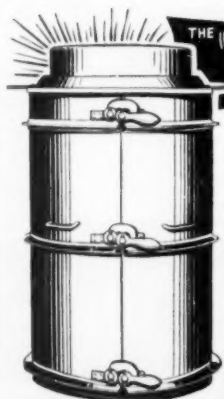
Pipe Finder—Leak Detector
Combination Type BL \$197.50

Free Illustrated Lit.

FISHER RESEARCH LAB., INC.

PALO ALTO

CALIF.



THE "Quinn Standard" FOR CONCRETE PIPE

The Quinn Standard is known as the best the world over, wherever concrete pipe is produced and used. Backed by over 35 years' service in the hands of hundreds of Quinn-educated contractors, municipal departments and pipe manufacturers who know from experience that Quinn pipe forms and Quinn mixing formulas combine to produce the finest concrete pipe at lowest cost.

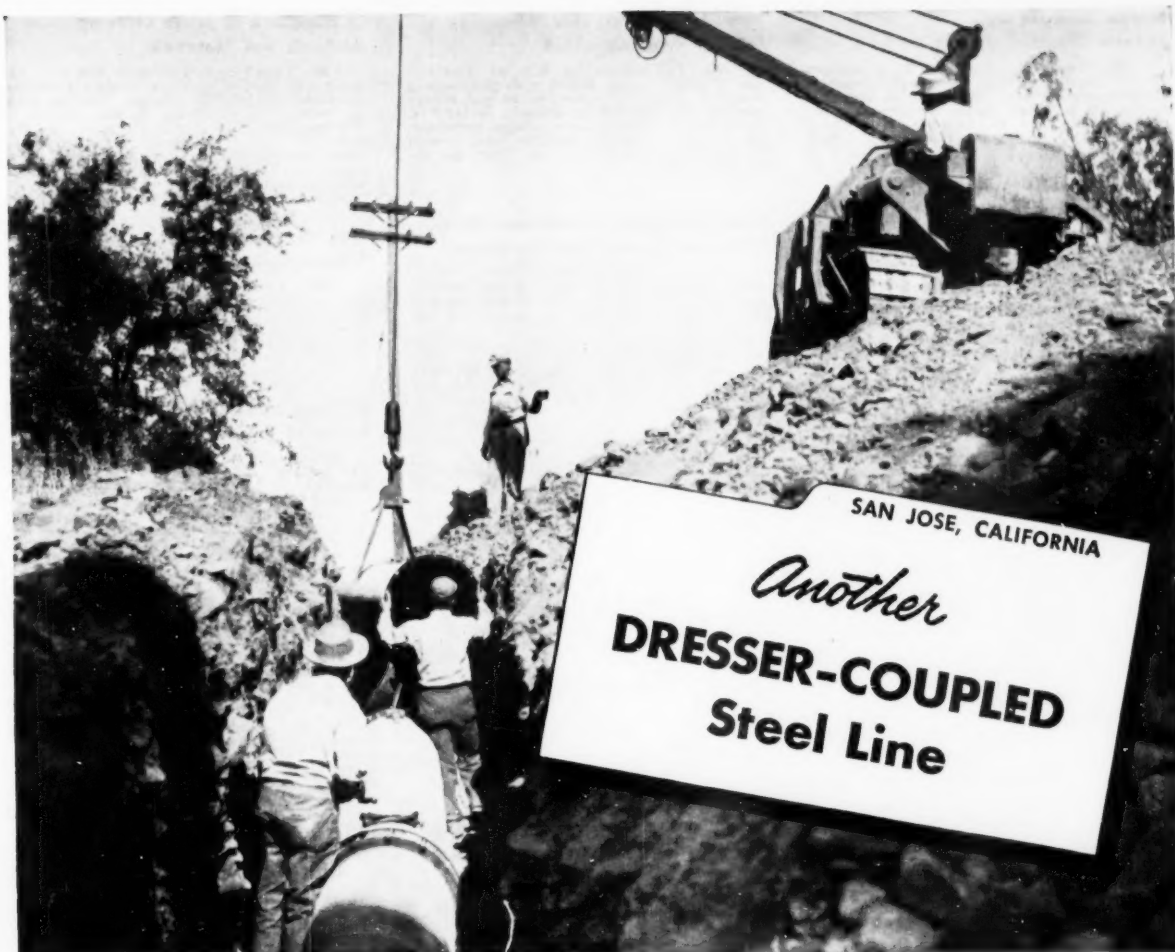
QUINN HEAVY DUTY PIPE FORMS

For making pipe by hand methods by either the wet or semi-dry processes. Built to give more years of service—sizes for pipe from 10" up to 120" and larger—tongue and groove or bell end pipe at lowest cost.

WRITE TODAY. Complete information, prices, and estimates sent on request.

Also manufacturers QUINN CONCRETE PIPE MACHINES

QUINN WIRE & IRON WORKS 1621 12TH ST. BOONE, IA



SAN JOSE, CALIFORNIA
Another
DRESSER-COUPLED
Steel Line

DELIVERS WATER CHEAPER

San Jose installs 12-mile Dresser-Coupled steel line . . . augments water supply from new reservoir.

Crossing the new Water Conservation District reservoir—replacing 8,000 ft. of flume, now submerged—this Dresser-Coupled steel line carries an increased water supply to San Jose, Los Gatos and Saratoga, California. Having installed over 200 miles of steel pipe since 1946, San Jose engineers are well acquainted with the many advantages of Dresser-Coupled construction.

The beam strength of lighter weight steel pipe, plus the resilience of both pipe and couplings,

assures a permanently tight line unaffected by surface shock, ground shift or washouts. Rugged coatings make the line impervious to corrosion and incrustation. Glass-smooth pipe linings sustain high flow-coefficients.

Long pipe lengths require fewer joints per mile—reduce laying costs. Small crews, with a minimum of skill, supervision and heavy equipment, make Dresser joints faster, surer—speed construction schedules. This adds up to lower cost, maintenance-free lines.



BE SURE you get the best line at the best price. Always put steel pipe and Dresser Couplings in your specifications.

DRESSER® COUPLINGS



Dresser Manufacturing Division, 69 Fisher Ave., Bradford, Pa. (One of the Dresser Industries). Warehouses: 1121 Rothwell St., Houston, Texas; 104 S. Bayshore Highway, South San Francisco, California. Sales Offices: New York, Philadelphia, Chicago, Houston, South San Francisco. In Canada: Toronto, Ont.

Design Data for the Spiraflo Clarifier

124. Be sure to investigate the advantages of the Spiraflo clarifier for sewage treatment. Full engineering data, description of the unit, test results and specifications are offered in 24-page Bulletin 122 by Lakeside Engineering Corp., 222 W. Adams St., Chicago, Ill. Check the coupon today.

A Short Course In Pipe Jointing

169. The story of rubber couplings for clay and concrete pipelines is graphically presented in the booklet "Pipe Enterprise", published by Hamilton Kent Mfg. Co., Kent, Ohio. Detailed description of pipe jointing methods; photos showing jobs where Tylox gaskets met the need for easily assembled, permanently tight joints installed under all conditions; and a report on the development, manufacture and outstanding features of the compression type gasket make this booklet valuable to every engineer and contractor. Check the coupon for free copy.

Non-Clogging Vertical Wet-Pit Pump Described

182. Full engineering data on Worthington "Freedo" wet-pit pumps with non-clogging impellers capable of passing solids and stringy material are included in Bulletin W-317-B12. Check these pumps for sump, sewage and drainage service. Bulletin available from Worthington Corp., Harrison, N. J. Just use the coupon.

Complete Catalog for Engineers Shows Water and Sewage Plant Equipment

191. The complete line of Jeffrey equipment for treatment of water, sewage and industrial wastes is covered in 52-page Catalog 833. Detailed information is provided on bar screens, grinders, *etc.* collectors, "Jigrit" washers, sludge collectors, feeders, conveyors this valuable booklet. Use coupon or write and other related units. Photos and drawings of installations plus capacity tables complete Jeffrey Mfg. Co., 947 N. 4th St., Columbus 16, Ohio.

A Handbook of Sewer Cleaning Methods and Materials

44. Complete, easy-to-follow directions for every type of sewer cleaning operations and the equipment needed for effective cleaning work is covered in a 40-page booklet issued by Flexible Sales Corp., 3786 Durango, Los Angeles 34, Calif. Full details are provided on power cleaning machines, the Sew-Ro-R, hand tools and all accessories. Water main and culvert cleaning methods are included. Check the coupon for your copy of this helpful handbook.

How Vacuum Filters Help Your Sewage Sludge Disposal

209. Applications of the Conkey sludge filter to all types of sewage sludge are described in Bulletin 100. Tables show filter sizes, weights, and give anticipated average results. Use the coupon to order your copy. General American Transportation Corp., Process Equip. Div., New York 17, N. Y.

Efficient Blowers for Activated Sludge Plants

232. Many advantages of Roots-Connersville positive displacement rotary blowers are described in Bulletin 22-23-B-13, which also provides characteristic curves for operation with constant speed, multi-speed and variable speed motors and details of several types of blowers. Get this helpful bulletin by checking the coupon. Roots-Connersville Blower Corp., Connersville, Ind.

Data Offered on Water, Sewage and Waste Treatment Equipment

263. Equipment for sewage treatment, water purification and industrial waste treatment is described in a 16-page Book No. 2440, published by Link-Belt Co., Colmar, Pa. Case histories, photographs and schematic drawings are included. Straightline and Circuline collectors, Thru-Clean and Straightline bar screens, Tritor screens, flash mixers, scum breakers and other units are described. Check the coupon for your copy.

How to Compute Quantities of Jointing Materials

271. A helpful table for determining quantities of "Tegul-Mineraloid" required, using jute or "Hyde-Ro Rings", plus complete answers to your questions on sulfur compound jointing materials will be found in Bulletin M-19 issued by Atlas Mineral Products Co., Mertztown, Pa. Check the handy coupon today.

Reference Book on Lubricated Plug Valves

273. Lubricated plug valves, including stick proof lever sealed valves for easy operation and positive mechanical seal are fully described in reference books issued by Homestead Valve Mfg. Co., Box 550, Corapolis, Pa. Check the coupon for your copy.

How to Dispose of Sewage and Industrial Sludges

281. Get full information on the C. E. Raymond System of combined incineration and sludge drying providing high temperature deodorizing for nuisance-free sludge disposal. Flexible layouts fit large and small communities. Use handy coupon or write Combustion Engineering Inc., Flash Dryer Div., 200 Madison Ave., New York 16, N. Y.

Instrumentation and Control Equipment For Water and Sewage Plants

298. Full engineering data on the instrumentation and control equipment needed in water works, sewage plants, pumping stations and related installations are provided in the "Application Engineering Data" binder issued by the Foxboro Co., Foxboro, Mass. Every engineer and designer should have this valuable material on hand. Check the coupon if you can use this data.

Get the Facts on The Contact Aeration Process

303. Full engineering details on the submerged contact aeration process of sewage treatment, including diagrams of plant units, area requirements, operating costs and other details are available in a bulletin of the Hays Process Co., Box 768, Waco, Texas. Check the coupon to get the facts.



water
is
important
to
everybody...

The Miss at this fountain of youth would be mighty disappointed if low water pressure were suddenly to deprive her of a drink—and so would millions of others who take water pressure for granted. One of the best, and least expensive ways to assure the constant flow of water is through Centriline.

The Centriline process thoroughly cleans and centrifugally applies cement-mortar to the interior of pipe lines in place—prevents corrosion, tuberculation and leakage; minimizes interruption of line operation and street traffic. For an effective, economical means of increasing flow capacity, look to Centriline.

Write for free booklet today.

CEMENT-MORTAR LININGS FOR PIPES IN PLACE

3,000,000 FEET



OF EXPERIENCE

CENTRILINE CORPORATION

A subsidiary of Raymond Concrete Pipe Co.

140 CEDAR STREET, NEW YORK 6, N. Y.

Branch Offices in Principal Cities of United States and Latin America

Need more facts about advertised products? Mail your Readers' Service card now.



with this...

you eliminate THIS—



**Instant contact reduces lost time and mileage
...makes each day's work more productive!**



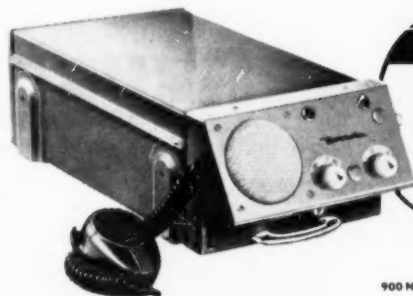
Centralized Control Saves Money. Your foreman at base station console coordinates activities, keeps progress report up to the minute every minute of the day.

Get more work out of men and equipment, cut "down time" and "deadheading," make each day's operations pay off in greater profits by using Motorola 2-way Radio. Instant contact centralizes supervision, coordinates work, reports breakdowns in seconds, helps you meet and *beat* deadlines. Boosted efficiency pays for your Motorola installation many times over.

Eight exclusive Motorola features guarantee precision selectivity, time-tested durability. "Permakay" wave filter eliminates 15 nuisance tuning adjustments forever. Get the facts *now* about this new, money-saving construction tool.

Write to Dept. 2286-PW today

Rugged Sensicon Dispatcher. Built to take jolts and shocks of rough roads. Serves as fixed or mobile unit. Features sealed-in selectivity.



Motorola Communications & Electronics, Inc.

A SUBSIDIARY OF MOTOROLA, INC.

900 N. Kilbourn Ave., Chicago 51, Illinois • Rogers Majestic Electronics Ltd., Toronto, Canada

WHEN ANSWERING THIS ADVERTISEMENT, PLEASE MENTION "ITEM 5373"

Now's the time to mail this month's Reader's Service card.

OSHKOSH

4-wheel drive trucks

pay their way-
every month of the year!

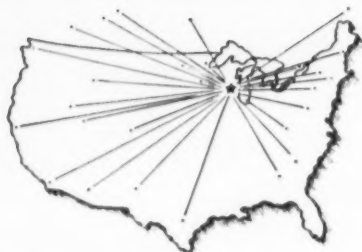


... in construction hauling; on-and-off highway service.



... in clearing snow clogged roads; V-plow or rotary plow operation.

... in road blading and other road maintenance jobs.



Service stations located at convenient points throughout the United States and Canada.

Oshkosh 4-wheel drive trucks are engineered and built to deliver years of dependable snow removal service, and then with equal efficiency, shift over to road maintenance, on-and-off highway hauling and other year 'round jobs with minimum upkeep expense. Compare Oshkosh with any truck—feature for feature—and you'll see why Oshkosh is a sound investment. Ask any user!

OSHKOSH

4 WHEEL
and
6 DRIVE
TRUCKS

OSHKOSH MOTOR TRUCK INC.
OSHKOSH WISCONSIN



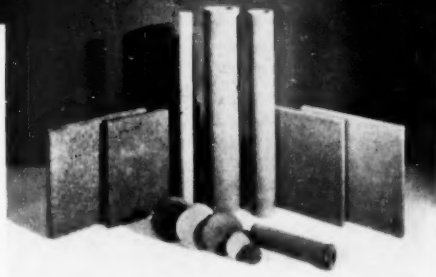
SMOKE BLOWN THROUGH a Norton ALUNDUM® seamless tube escapes throughout the tube's entire area. Such a tube gives most efficient filtration and ease of cleaning by back washing. When selecting tubes for your specific application be sure they embody this important feature.

Why Norton seamless tubes give you better diffusion

Only Norton ALUNDUM tubes have the seamless construction that means more uniform diffusion and enables faster, more thorough cleaning. And like all Norton porous mediums they're made with the patented *controlled structure* process that assures even distribution of pores — in the size and open-pore ratio that best meets your needs.

Cost-Cutters Over A Wide Job Range

In any form, Norton porous mediums have exceptional resistance to breakage, chipping, and acid and alkaline conditions. They're designed to perform better, last longer and cut your operating costs in many applications. For example: tubes for diatomite filters in swimming pools . . . plates for rapid sand filters in water filtration . . . plates and tubes for aeration in activated sludge treatment.



NORTON ALUNDUM POROUS MEDIUMS are available as tubes, plates and discs in a wide range of sizes.

Get The Whole Story

See your Norton Representative for complete facts on how you can get more savings and satisfaction with Norton porous mediums.

Or write, describing your requirements, to **NORTON COMPANY, 231 New Bond St., Worcester 6, Mass.** *Canadian Representative: A. P. Green Fire Brick Co., Ltd., Toronto, Ontario.*

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

NORTON

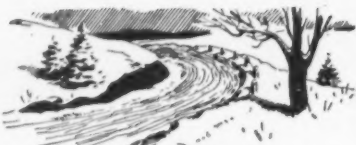
POROUS MEDIUMS

Making better products to make other products better

NORTON COMPANY, WORCESTER 6, MASSACHUSETTS

Get full details of this month's products . . . mail your Readers' Service card today.

STERLING ROCK SALT SOLVES WINTER'S TWO TOUGHEST TRAFFIC PROBLEMS



HEAVY SNOW

Straight Rock Salt converts normal snowfall into slush for traffic to whisk away. Keeps heavier falls "mealy" for quick and easy clean-up by plow.



ICE AND COMPACTED SNOW

Straight Rock Salt's greater melting power perforates and breaks up ice crust, loosening it from pavement, to be worked to the side by traffic or by one pass of the plow.

Handle Your Ice and Snow... TEN TIMES FASTER AT HALF THE COST

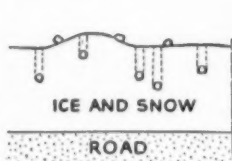
Ten times faster! One truckload of STERLING *Auger-Action* ROCK SALT covers up to 15 miles per load. The same truck, with abrasives, will cover 1½ miles only. *Rock Salt actually does the whole job—and does it better—in one tenth the time.*

Half the cost! STERLING *Auger-Action* ROCK SALT is easier to store and handle. It spreads faster and goes further. Your own accounting will show the cost per mile for rock salt about *half* that of outmoded abrasive-chemical combinations.

WHY STERLING *AUGER-ACTION* ROCK SALT DOES THE JOB BETTER!



STERLING *Auger-Action* ROCK SALT can be used in any mechanical spreader. Requires no special handling or treatment.



Each salt crystal, generating its own heat, quickly bores straight down through the entire crust of snow or ice.



As crystals reach pavement, they become brine which flows laterally, breaking bond between ice and surface.



Broken ice is easily removed with one pass of the plow or scraper. Heavy traffic spots clear themselves by friction of passing vehicles.

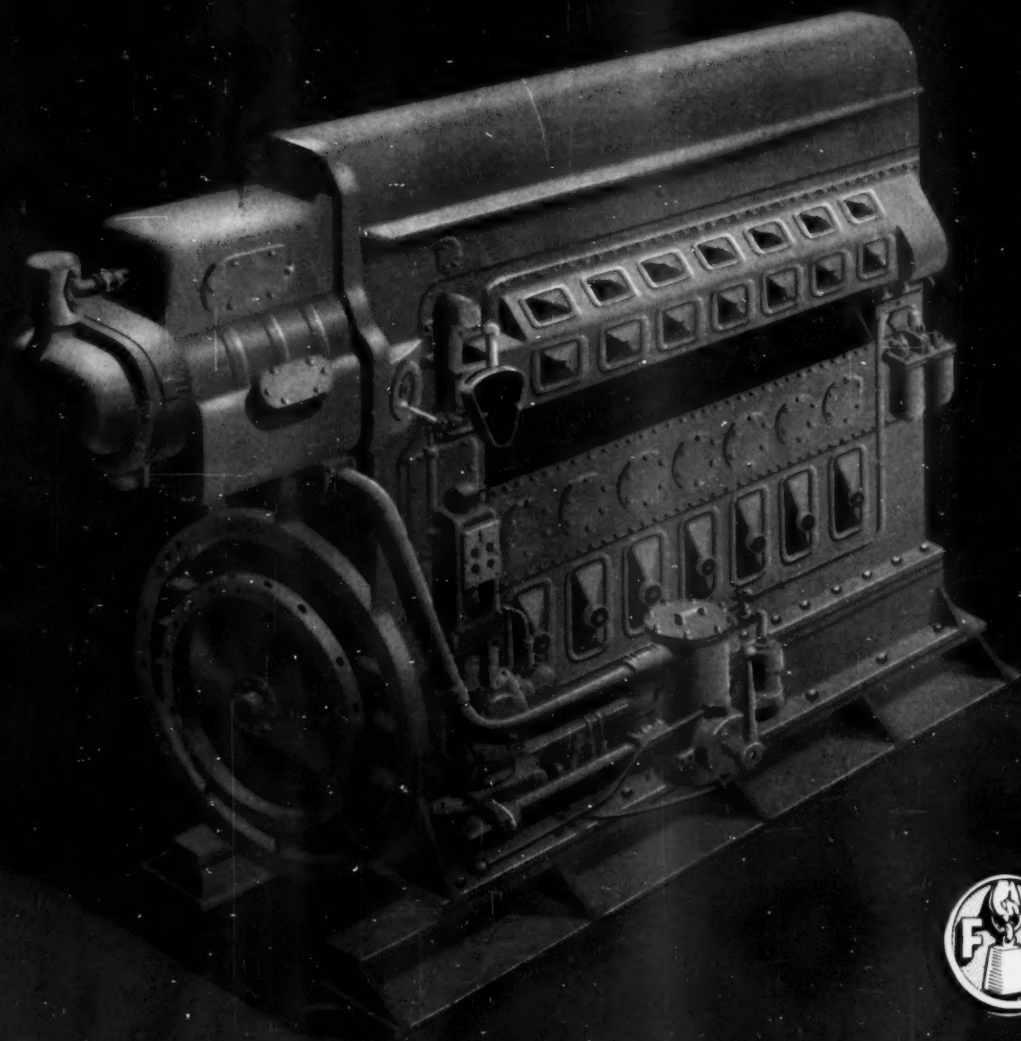
ORDER NOW . . . IN CARLOADS, BULK OR 100 LB. BAGS

STERLING *AUGER-ACTION* ROCK SALT

International Salt Co., Inc., Scranton, Pa.

SALES OFFICES: Atlanta, Ga. • Chicago, Ill. • New Orleans, La. • Baltimore, Md. • Boston, Mass. • St. Louis, Mo. • Newark, N. J. • Buffalo, N. Y. • New York, N. Y. • Cincinnati, O. • Cleveland, O. • Philadelphia, Pa. • Pittsburgh, Pa. • Richmond, Va. • ENGINEERING OFFICES: Atlanta, Ga. • Chicago, Ill. • Buffalo, N. Y.

Thousands use our Readers' Service card to keep up to date . . . do you?



The Fairbanks-Morse Opposed Piston Diesel Model 38F 5 1/4. 225 to 750 horsepower. Diesel, Dual Fuel and Spark-ignition options. Other O-P engines available in horsepower ratings to 2400.

Some engines are not good enough

Yes, there are some diesels which just do not have what it takes for the job. They cannot satisfy the owner's pride in smooth, trouble-free operation and are lacking in the ability to square a balance sheet of operational costs and profits. For the more difficult jobs, many engines are simply not good enough.

Maybe you should pay more and get more!

If you want more engine-hours with fewer man-hours, *then* you should have the F-M Opposed Piston Diesel which will cost a little more and give you much, *much* more.

Fairbanks, Morse & Co., Chicago 5, Illinois.



FAIRBANKS-MORSE

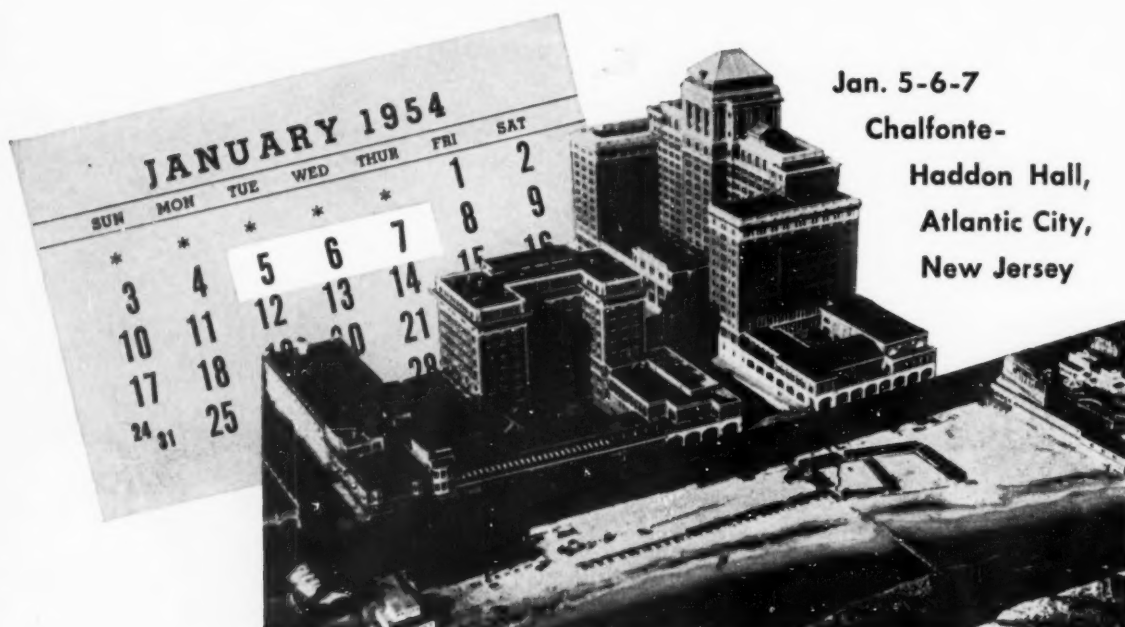
a name worth remembering when you want the best

DIESEL AND DUAL FUEL ENGINES • DIESEL LOCOMOTIVES • RAIL CARS • ELECTRICAL MACHINERY • PUMPS • SCALES • HOME WATER SERVICE EQUIPMENT • FARM MACHINERY • MAGNETOS

MAKE PLANS **NOW** TO ATTEND THE

1954 Annual Meeting

AMERICAN ROAD BUILDERS' ASSOCIATION

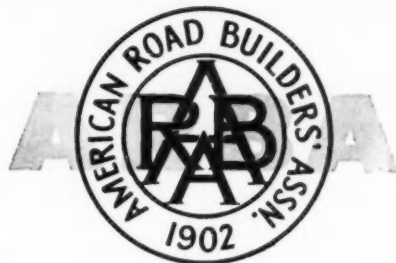


Jan. 5-6-7

Chalfonte-

Haddon Hall,
Atlantic City,
New Jersey

- ★ **MEET** Old Acquaintances — Make New Friends
- ★ **HEAR** Nationally-Known Speakers and Highway Authorities
- ★ **LEARN** What's New in Road Building, Maintenance and Administration
- ★ **PROFIT** From Technical Meetings, Papers, Reports, Panel Discussions
- ★ **ENJOY** Superb banquet—gala entertainment—Special events for ladies



detailed information sent on request

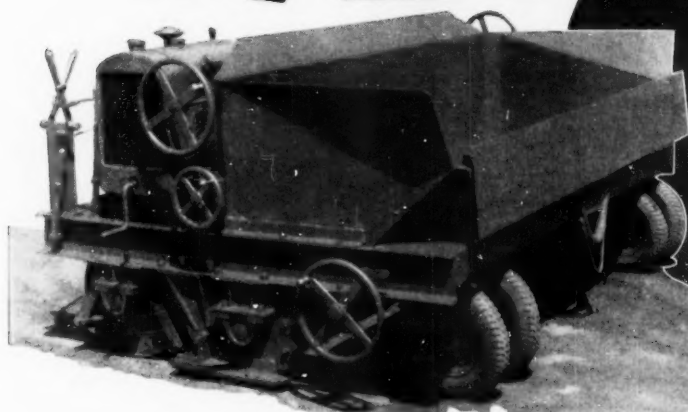
AMERICAN ROAD BUILDERS' ASSOCIATION

WORLD CENTER BLDG., WASHINGTON 6, D. C.

Now's the time to mail this month's Reader's Service card.

A NEW

BLACK TOP PAVER ADNUN JR MODEL 8

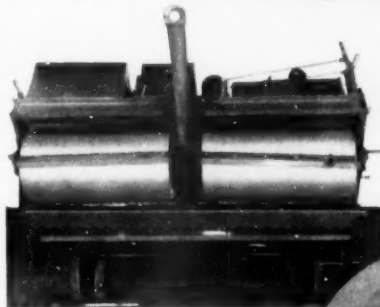


HERE is the greatest advancement in small tow type asphalt paving machines ever offered the contractor! The Adnun Jr. is in no sense to be compared with the ordinary hopper and screed on wheels. There is nothing like it! It is a highly engineered, quality, precision, paving tool.

It is self-maneuvering without load. Power reduces relocation time. The 2-ton capacity hopper is equipped with a powered Raker Bar. An Oscillating Screed *cuts* the material off at the right thickness without troweling fats to the surface. Overlapping action makes a tight, compact joint and reduces raking. Dual control assures easy handling from either side of the machine. Easy adjustment takes care of practically every requirement that you will meet.

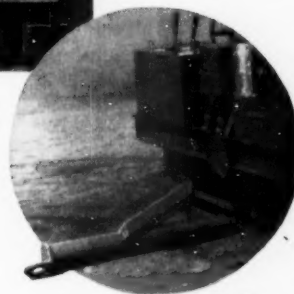
The smoothness of course surface approaches that of large highway machines due to the Adnun principle of Continuous Coarse Correction. This principle reduces surface error with each successive course.

Here is the answer to the parking lot, driveway, tennis court type of job. It does them more cheaply—does them faster—does a better job. There is a new bulletin! Let us send you one.



The underside of the Adnun Jr. Model 8 showing the Cutter Bar.

No trailer is needed for the Adnun Jr. The removable Trailer Hitch permits the Adnun Jr. to be lifted by the truck hoist and towed away.



ADNUN JR

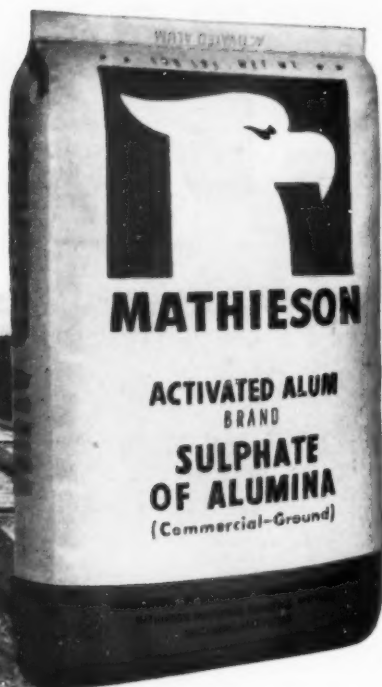
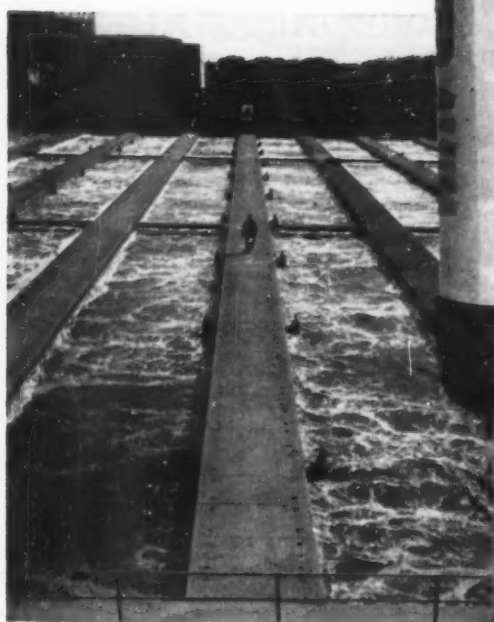
MODEL 8

BLACK TOP PAVER

**BLAW-KNOX
COMPANY**
FOOTE CONSTRUCTION
EQUIPMENT DIVISION
1954 State Street,
NUNDA, NEW YORK



It's a fact... our handy Readers' Service card is the way to get new catalogs.



superior water treatment starts with Activated Alum

A filter alum designed specifically for water and sewage treatment, Mathieson Activated Alum Brand of sulphate of alumina is an unusually effective coagulant. The porous structure of Activated Alum causes it to dissolve rapidly, allowing a greater volume of water to be treated in each treatment period. Faster settling, too, is obtained because the finely ground natural silicates in Activated Alum aid coagulation and form heavier floc. Though high in alumina, Mathieson Activated Alum is free-flowing and easy to handle. Write today for full information.



MATHIESON CHEMICAL CORPORATION
Mathieson Industrial Chemicals Division
Baltimore 3, Maryland

2096

Need more facts about advertised products? Mail your Readers' Service card now.



YOU are the key!



YOU

as an official of your city —



YOU

as a citizen, can save the lives of your fellow-citizens



YOU

should take steps NOW to install a disaster warning system

● *because*

GOVERNMENT OFFICIALS warn us of probable bombing of our cities.

● *because*

the Federal Civilian Defense Administration urges all cities to prepare themselves for disaster.

● *because*

Congress provides **MATCHING FEDERAL FUNDS**, grants top government priority to disaster warning systems in each target area.



**FEDERAL
THUNDERBOLT**
directional beam siren

But, as we hope to continue to say, this is a free country. The warnings and the funds are there *but YOU are the key* to the entire problem and only YOU can decide your community's future safety!

Let the experts assist YOU. Federal Enterprises will give your specific problem full personal attention without obligation; will help in surveying, engineering and supplying a complete disaster warning system. Federal has already installed successful systems in over 250 cities in key areas.

PHONE, WIRE OR WRITE FEDERAL FOR FURTHER INFORMATION

**FEDERAL
ENTERPRISES, Inc.**

Formerly, Federal Electric Company, Inc.

8733 SO. STATE STREET

CHICAGO 19, ILLINOIS

Yes --

you can use smaller pumps



...when you protect pipe lines with
BITUMASTIC® 70-B ENAMEL

PPIPE LINES don't "shrink" when interior surfaces are lined with Bitumastic 70-B Enamel . . . because this durable enamel prevents rust, corrosion, incrustation and tuberculation. With an inside diameter that *stays* the same, line capacity doesn't decrease. So there's no need, even after decades of service, to replace pumps with bigger ones that cost more to buy and operate.

By using Bitumastic 70-B Enamel, you also save on the initial cost of steel pipe. You don't waste money by buying *over-sized* pipe in order to allow for future "shrinkage." You specify pipe solely on the basis of

the capacity you desire.

Bitumastic 70-B Enamel — when applied to a thickness of $\frac{3}{16}$ " — protects the *exterior* of pipe against the corrosive action of soil. It is wasteful to specify an excess of wall thickness to compensate for corrosion. It is more economical to specify just enough wall thickness to give the

pipe adequate structural strength and to use Bitumastic 70-B Enamel to prevent corrosion.


For your large-diameter water lines specify strong, durable steel pipe, lined and coated with Bitumastic 70-B Enamel. Your community will get worth-while savings. Write for full information.



KOPPERS COMPANY, INC., Tar Products Division, Dept. 1255-T, Pittsburgh 19, Pennsylvania

DISTRICT OFFICES: BOSTON, CHICAGO, LOS ANGELES, NEW YORK, PITTSBURGH, AND WOODWARD, ALA.

Need more facts about advertised products? Mail your Readers' Service card now.



...be ready for it this winter
with **BAUGHMAN**
the only complete line of
ICE CONTROL EQUIPMENT

**A Complete Line
For Every Budget**

● Pull-Type or Truck-Mounted — Hydraulic, Mechanical or Traction Powered

- To Spread: Sand
- Cinders ● Salt
- Calcium Chloride
- Gravel ● Chips

**featuring the sensational
SPREAD-MOBILE with New Hydraulic
Controls... "Center-Spred" Design**

Spreads IN FRONT OF all four wheels for perfect traction, better visibility. All operations, including amount and width of spread, HYDRAULICALLY CONTROLLED from cab. Other exclusive Spread-Mobile features: EXHAUST HEATER, to prevent load freezing; SPLIT-BOTTOM DUMP for off-season dump-body uses; heavy-duty AUXILIARY GAS ENGINE for hydraulic system; streamlined SINGLE-WELD BODY. Write for Bulletin A-370-H.



New Model SC-52 PULL TYPE SPREADER

Popular low-cost traction powered type with improved lower distributor plate (only 13" above ground). Spreads in complete circle under wheels of truck. Write for Bulletin A-371.

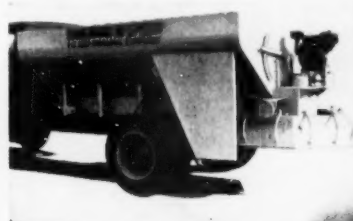


BAUGHMAN MANUFACTURING COMPANY

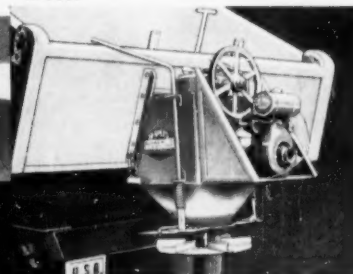
221 Arch St. • Jerseyville, Illinois



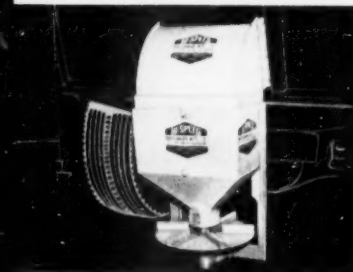
MODEL 51-HDC Hydraulic "Cinder Cracker" (Chain-drive MODEL 51-CDC similar). Bulletin A-354.



MODEL KMC-4. New Fifth Wheel design for positive spread control of sand, cinders, salt, etc. Drop-bottom adaptable to off-season hauling and dumping. Bulletin A-380.



MODEL MD-1 Self-powered Tailgate Spreader for dump truck ice control. Bulletin A-357.



MODEL HD-51 Hydraulic-driven Tailgate Spreader with cab control. Bulletin A-353.



MODEL 51-5M "Salt Miser" scatters salt or chloride. Self powered. Bulletin A-350.

CAN YOUR MOTOR GRADER BEAT THIS RECORD?



Keokuk County's tough No. 12 spreads stone on a county road in preparation for winter.

Keokuk County, Iowa, has a Cat® No. 12 Motor Grader that has been stationed in Keota township since 1945. It maintains 90 to 100 miles of roads, covering them once a week in summer, clearing snow in winter. And in more than 12,000 hours of steady work, the cylinder head has never been off the engine!

If you've got a grader with that much trouble-free operation, we'll bet it's Caterpillar-built.

You've heard plenty about the bonus taxpayers get in these big yellow machines...lower fuel cost, less down time, longer life, higher resale value. Here's something else to consider at this time of year:

1. Caterpillar equipment is designed and built to work longer into the winter—as long as you want to work.
2. It starts fast, even at the lowest temperatures.
3. It has the rugged strength to work in frozen material.
4. It requires no pampering in cold weather.
5. It gets the job ready for an early spring start, and has the power and traction to tackle thaws and mud.

Prepare for winter now by seeing your Caterpillar Dealer. He'll prove by an on-the-job demonstration that you'll get more months of work out of these tough, durable machines. And he'll back their long life with genuine parts and reliable service.

Caterpillar Tractor Co., Peoria, Illinois.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks. ®

**WINTERIZE
YOUR JOB WITH
CAT EQUIPMENT**



PUBLIC WORKS

Magazine

VOLUME 84 • NO. 12

DECEMBER 1953

● MECHANICAL cement spreader, fed by truck which pulls it, deposits measured amount of cement.

SOIL CEMENT

is VERSATILE

A BAR graph depicting annual soil-cement street construction during the last five years looks not unlike a side view of a steep-rising stairway . . . an upward climb that has been paralleled by interest in this material on the part of city and county paving officials over the nation.

Soil-cement was unknown twenty years ago, yet today there are more than 100,000,000 sq. yd. of soil cement in the United States. The material has been proved in climates as diverse as Louisiana and Alaska, Maine and California, and engineers and officials all over the country are making increasing use of it. A now familiar pattern is for cities and counties to graduate from small projects and uses to large scale paving programs.

A recent PUBLIC WORKS article pointed out that much of this growth is attributable to improvements in techniques and equipment which have speeded construction time. Another prime reason is the versatility of the material. Originally used only for light traffic roads, soil-cement is today being employed for city residential streets; municipal and county

airports; ditch and canal linings; for repair, widening and reconstruction of existing roads, parking lots and storage areas; and for stabilizing subgrades for other types of paving, to mention only major purposes. Experience with the material has encouraged engineers to employ it more widely.

From Shoulders to New Construction

An example of graduation from small to more sizable projects is provided by Camden County, New Jersey, located just across the Delaware River from Philadelphia.

In the war year of 1944, considerable difficulty was experienced with softness and erosion of 9 and 10-ft. shoulders along Evesham Road in the county. In addition to being a hazard to traffic, required maintenance was high at a time when labor was short. After investigation, the county engineer and the assistant engineer decided to use soil-cement in an effort to stabilize a short stretch of shoulders, using the county's forces and available equipment. The excellent results obtained led to stabilization of about 60,000

additional sq. yd. of shoulders in the county.

Camden county next used soil-cement base for road and street paving in 1945, when constant repair and increasing costs on South Park Drive suggested that reconstruction was advisable. This troublesome road consisted mainly of a failing granular base with a conglomerate of old bituminous layers, built on fills across mud flats near the Delaware River. A stronger base was needed, and six thousand square yards of 6-in. thick soil-cement was placed. Although built under adverse weather conditions, the job met with good success. It was followed in 1946 by reconstruction of the "worst section" of Kirkwood Road which had been subject to annual spring break-ups for several years. In the two severe winters following, those sections of the road not paved developed deep ruts and chuck holes and the surface showed almost complete deterioration. The soil-cement pavement showed no damage.

Good performance of the material in these trouble spots resulted in construction of some 365,000 sq. yd.

of soil-cement shoulders, roads and streets in the county in the seven year period ending in December, 1951—about 200,000 sq. yd. by local contractors and the remainder by county forces.

From New Construction to Repair

The North Carolina State Highway and Public Works Commission, in 1937, constructed a short stretch of soil-cement road in coastal Carteret County. This section was regarded as an experimental pavement and closely watched to see if the sandy soils found along the coastline of the State, could be successfully stabilized. Good results led to building in 1939 of a 2.4-mile stretch of soil-cement base in Alamance County where two heavy clay soils are found. These two roads, constructed with widely different soils, provided precedent for later construction of soil-cement base equal to more than 900 miles of 20-ft. wide road—a total second only to California.

In 1939, Commission engineers decided to expand use of the material to the repair and patching of damaged pavements of other types. This work was begun near Greensboro on an 18-mile stretch of State Route 49 where serious failures had occurred. Damaged sections were excavated to subgrade or below, and filled with soil-cement mixed in a concrete type mixing machine. Patched areas were compacted with hand operated pneumatic tampers to about an inch below the grade of the surrounding pavement, and after priming were covered with bituminous plant mix.

This work has since spread to other divisions outside the Greensboro area. From 1943 to 1953, 400,000 sq. yd. of soil-cement was used for patching and repairing roads in the State.

A typical recent patching project consisted of 2,000 sq. yd. of machine-mixed soil-cement in Wake County, where a local material of quarry screenings was used for the "soil" portion. Three wheelbarrow loads of screenings, one bag of cement and six gallons of water were mixed at a central point to produce about nine cu. ft. of material which was hauled to the patching site in trucks. The material was placed in 4-in. layers and compacted by hand operated air tamps. Each layer was scratched with garden rakes before addition of the next, and the completed patch sealed with an application of bitumen, then sanded.

Nearly every city and county offi-



Photos courtesy Portland Cement Association

● **CONSTRUCTING** soil-cement base for new cement concrete pavement. Traveling mixing machine picks up windrowed soil and cement for mixing with water.

cial has been faced with the problem of an old road or street where stop-gap patching and repair and thin-coat resurfacing don't do the job needed, but where traffic fails to warrant high-type pavement. In many such instances, soil-cement has proved to be an economical and practical answer because it utilizes 85 to 90 per cent of the existing roadbed material to produce a new pavement.

An excellent example of new streets from old is provided by Peoria, Illinois.

In Peoria, the problem was a number of granular base streets on which maintenance costs were becoming increasingly heavy. Patching, use of cinders and oiling was of short lived benefit. After visiting several projects in the surrounding area, officials in 1948 authorized construction of 3,000 sq. yd. of soil-cement base streets. Success with this short stretch led to institution of a long-range program which is now in its fifth year, and which has met with enthusiastic response from property owners. According to the commissioner of public works, the city has been swamped with petitions, although property owners pay 75% of the cost by special assessment.

An interesting note on Peoria's construction is that bituminous mats on some old streets have been scarified and incorporated in the soil-cement mixture. Where manholes were encountered, the top was removed and the opening boarded over. After completion of the paving, the area was uncovered and later built up to grade. Much the same procedure was used in paving of Crossett, Arkansas, streets except that in some cases plastic soil-cement was used around the man-

hole frames instead of a compacted mixture. Soil-cement paving in Peoria has also been speeded through use of a soils map of the greater Peoria area, prepared some time ago. It is necessary for engineers only to know the percentage of coarse gravel in the surface layer to be processed in order to determine cement requirements for any soil in the district.

Airport Pavements

In 1940, there were less than 70,000 sq. yd. of soil-cement base airport paving in the United States. By the end of 1942, the year after Pearl Harbor, there were 16,347,677 sq. yd. The yardage placed in the single year 1942 was more than twice that placed in all preceding years.

This large wartime construction volume provided good evidence of the practicality of soil-cement for airport use. The large, level and unobstructed area required for airfields is literally tailor-made for this type of construction which utilizes mechanized equipment to the maximum. At Biggs Field in El Paso, Texas, for example, soil-cement airport runways were built at an average rate of nearly 1½ miles of 20-ft. pavement per working day. This field, built during war years, has handled increasingly large volumes of traffic and is in excellent condition today.

Recent examples of city, county and community airports built with soil-cement base are Columbus, Nebraska, airport, built in 1952 and consisting of a runway, a taxiway and an apron; Cairo, Illinois, airport where 11,112 sq. yd. were placed in 1952; Mayfield-Graves Airport in Graves County, Kentucky, built in 1952, with 50,580 sq. yd. of soil-

cement base; Paris, Tenn., Airport, built in 1952, 25,000 sq. yd.; Racine, Wisconsin, Airport, completed only recently and consisting of a 50-ft. wide runway, 2,081 ft. long; and Sterling, Colorado, airport where some 58,000 sq. yd. of soil-cement base is being used.

For Stabilizing Subgrades

The use of soil-cement for stabilizing subgrades for heavily traveled concrete highways has found its greatest use in California, though several other states, notably Texas, Oklahoma, Louisiana and Indiana, have built similar bases. By 1953, there were more than 4.5 million sq. yds. of soil-cement base for concrete pavement in California.

The major reasons for use of cement-treated subgrade are to prevent possible faulting at joints, prevent subgrade pumping under certain soil conditions, and to increase subgrade bearing values. This has become particularly important in California, where traffic volumes and weights have increased enormously over the past 15 years. It has also made possible use of local materials for subgrades in areas where good base materials would otherwise have to be imported.

The Hollywood Freeway, a 10-mile long, 8-lane superhighway, provides an example of this use of soil-cement. Contracts were awarded several contractors who developed their own methods and techniques in incorporating required amounts of portland cement and water with the upper 4 in. of a two-course granular base. The general procedure was to set steel forms to the grade of the finished concrete pavement, and to build the stabilized 4-in. subgrade below the forms. After compaction, rolling and finishing of the base, a curing seal was



● SPRAYING a thin coat of light bituminous material on the soil-cement base to seal the surface and hold water for curing in the base structure.

applied and the 8-in. concrete pavement laid, sometimes as soon as the following day. Train methods of construction, including traveling mixing machines were developed by some contractors who during later stages placed up to 5000 lineal ft. of 12-ft. wide base per day.

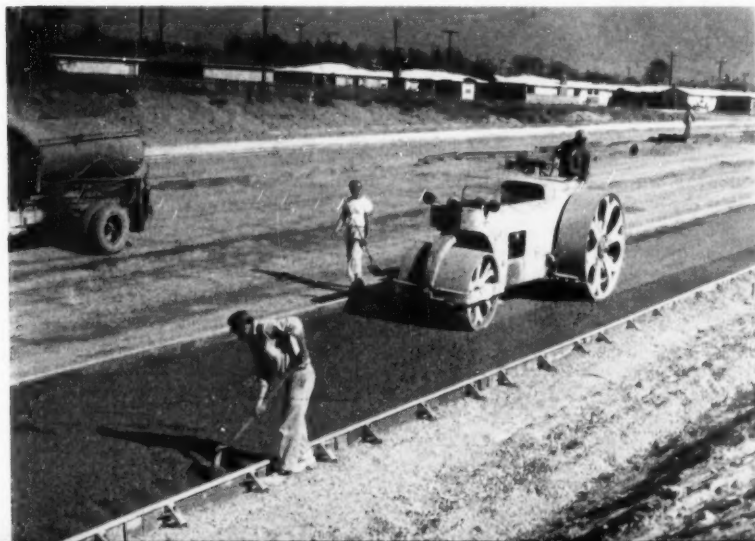
State Highway Engineers estimate that the cost of this base treatment—averaging about 34 cents per sq. yd. completed—is far below the cost of any repair made necessary because of subgrade failures. That this "ounce of prevention" is considered economically justified for heavy-duty roads is borne out by the fact that it has become standard practice on main California highways.

No "Import" Problem

In those areas where good road building materials are absent, or where sources of supply are being depleted, soil-cement has proved to be particularly a valuable cost saver.

An example is Madison County, Tennessee, which contains no known deposits of granular material suitable for road aggregate. For many years the county had to import chert and gravel or use local sand-clays for surfacing unpaved rural roads which carried traffic loads up to 600 vehicles per day. In 1947, the former county engineer pointed out to officials that annual maintenance expense on these roads was eating up the county's road-building budget. He asked for funds that would permit a program of reconstruction, aimed at improving the durability and performance of these roads and doing away with costly stop-gap measures. Soils ranged from sandy clay loams to silty clays, and with the existing granular material offered excellent prospects for new soil-cement roads of good durability and strength. A bond issue was approved for county road construction and maintenance, and the first soil-cement roads were undertaken and completed late that same year. Included were ten projects totaling a little over 15 miles. Work was done by a traveling mixing machine.

No paving was done in 1948, but in 1949 the County resumed construction. The Tennessee legislature had set up a rural road program in that year which, along with Federal Aid Secondary program funds, provided money for continuance of the work. A study of soil-cement roads previously constructed in the area showed their durability and maintenance. (Continued on page 104)



● STEEL WHEEL roller compacts soil-cement base for new concrete pavement in California.

Public Works of SAN DIEGO on TV

RICHARD GALLAGHER

Director of Public Works, San Diego,
Calif.

THE Department of Public Works of the City of San Diego, was invited recently to participate in an educational television show in which the viewers were given some insight into various public works operations of the city. As Director of the Public Works Department, the writer outlined the functions of the Department and presented information relative to the Street, Shops and Equipment Divisions.

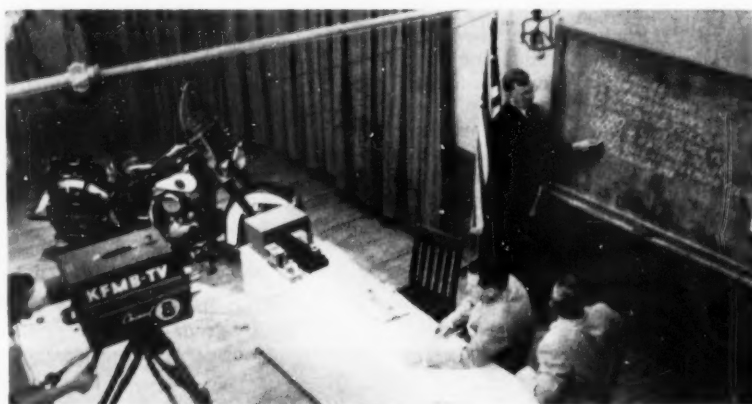
Verne Parker, the Assistant Director of Public Works, then described the activities of the Sanitation, Sewer, and Buildings Division. Both of these speakers used large 8x10 dull finish photographs of the various activities of those Divisions, while they were verbally describing them. Next, Eric Quartly, Superintendent of the Sewage Treatment Division, used a scale model of the City's sewage treatment plant to explain the methods of sewage treatment used.

William McKinley, Superintendent of the Electrical Division, and Edward Simon, Radio Engineer for that Division, described the work of that Division in electrical maintenance and construction, electrical engineering designs and plans and communications. Mr. McKinley concluded the session with an actual demonstration which the viewers all heard in which he used the radio mike on the police motorcycle which can be seen in the pictures, and sent out a test call to the Police Main Transmitter and received an acknowledgment and "OK."

In connection with the model of the sewage treatment plant, it is of interest that Mr. Quartly and others of the personnel of that Division have since constructed a scale working model of the plant, using plastic pipes, plastic, workable pumps, and



● SCALE model of the sewage plant with Superintendent of Sewage Treatment Eric Quartly demonstrating. L to R: Messrs. Parker, Gallagher, Quartly and Stanley.



● TV SETUP: Mr. Parker at blackboard; Messrs. Stanley and Gallagher look on.

artificially colored waters, and even a small scale conveyor and dried sludge drop chute which dropped the sludge pellets into a toy truck. This model received considerable attention at the San Diego County Fair and was also featured at the City of San Diego Open House on September 24 and 25, 1953.

This program was beamed largely at school children who were in the classroom at the time. DeGraff Stanley was the producer of this

show which was put on under the auspices of the San Diego City Schools Educational Television Programs.

The people in the large photograph are, from left to right, Verne Parker, Assistant Director of Public Works, Richard Gallagher, Director of Public Works, Eric Quartly, Superintendent of the Sewage Treatment Division, and DeGraff Stanley, producer for the San Diego City School System.

Sewage Treatment: "TOWN and GOWN" Partnership

J. L. MORRISON,
School of Journalism, UNC

AN unusual "town and gown" partnership in a modern sewage treatment plant is working to the mutual advantage of the Town of Chapel Hill and the University of North Carolina. The plant—a high-rate trickling filter—has become an integral part of the field training program by which graduate civil engineers from many foreign countries work with the University's Department of Sanitary Engineering.

Designing the control house to provide pilot plant facilities for such sanitary engineering students is one of the features of the sewage treatment plant. This was done by adding space at the rear of the control house where trenches were provided in the concrete floor. The trenches are covered with removable steel plate so that experimenters can have full opportunity to view and check sewage and sludge flows without inconvenience and without risking damage with above-the-floor pipe.

Already in limited use, the pilot plant's teaching potential is expected to be greatly enhanced if the University can secure additional equipment to complement the basic design. Even so, the pilot plant is only part of the "town and gown" partnership in the sewage treatment plant. Because the plant is used by both, the University financed half the plant's cost and the town issued \$200,000 of bonds for its part.

One special advantage accruing to the town in the sanitary engineering students' use of the sewage treatment plant, according to Town Manager Thomas D. Rose, is that the town is spared the expense of operating a testing laboratory of its own. Samples are taken at the plant every day and used in the University laboratories, so that Mr. Rose has merely to pick up the telephone whenever he needs a BOD report on the raw sewage or on the sewage plant effluent.

The extent to which foreign students may take back with them impressions of American engineering techniques and equipment may be

Guillermo Roviralta Redondo and Carlos Borge Calvo; Brazil, Lindolpho Pessoa da Cruz Marques Filho; Mexico, Roque Yanez Martinez; and Japan, Fumio Ohashi.

Those who designed the Chapel Hill plant as something of an international showcase had the responsibility, therefore, of setting it up as a reliable exponent of accepted American techniques and equipment. Inclusion of the pilot plant space in the overall design came at the urging of Prof. Herman G. Baity, head of the Sanitary Engineering Department in the University's School of Public Health. Prof. Baity,



● **READY** for sampling: Guillermo Reviralta Redondo and Antonio Sucre Pereira.

gauged by the fact that in the summer of 1953, for instance, the field training program included ten such students, all graduate civil engineers and most of them possessing the MPH degree. All hold important public health posts in their own countries and were sent to Chapel Hill for an intensive 8-week program administered by the Office of International Health of the USPHS. One of the visitors, for instance, is director of public utilities for the City of Monterrey, Mexico.

Countries sending graduate civil engineers to take part in the 1953 summer field training program are as follows: Panama, Roberto Reyna Rodriguez and Antonio Sucre Pereira; Peru, Menaut Eduardo Z. Niezen; Germany, Baldefrid Johannes Hanisch; Bolivia, Francisco Soto Saracho; Costa Rica,

now on leave in Geneva with the World Health Organization, deserves some of the credit for the fact that so many of the foreign visitors are from Latin America. He has spent many years in Latin America, notably during World War II when he helped organize the public health *servicios* in Brazil, opening that country's interior as a source of scarce strategic materials at that time.

As for the Chapel Hill plant itself, new outfall lines of some 8500 ft. were built to the site of the plant, which presently became a key public relations spot for the town. The University, soon after, built its new Finley Golf Course immediately adjacent to the sewage treatment plant, and the 17th green is located only 300 ft. from the control house. "Being on display all the time," Mr.

Rose smiles, "means we've got to be especially conscious of the plant's appearance. Foreign students are reporting on us to their people back home, and the golfers—some of whom may be state officials or trustees—have to look us over whether they want to or not."

The primary clarifier features a mechanically cleaned screen plus a hand-operated standby cleaner and a screenings grinder. The clarifier is circular, 70 ft. in diameter with a 12-ft. sidewater depth. It is designed for a two-hour detention period (including recirculation), and the effluent passes into a control box which is part of a by-pass arrangement whereby certain elements—either out of order or not needed—can be omitted from the treatment process.

The trickling filter is 120 ft. in diameter with a four-foot depth of stone, and its high-rate performance is worth comparing with the town's old filter. The new one permits a rate of flow of 16 mgad as opposed to a rate of only 2 mgad in the old filter of the same diameter and equipped with twice the stone depth.

A wet well adjacent to the control house contains a recirculating pump which picks up the trickling filter effluent and returns it to help break down the raw sewage just entering the primary clarifier. The plant now recirculates $1\frac{1}{2}$ mgd and is taking raw sewage at the average rate of 600,000 gpd.

The secondary clarifier provides the final treatment for the liquid phase of the sewage. It is also circular, with provision for mechanical sludge removal. Secondary sludge is returned twice daily to the primary clarifier. This secondary clarifier

is fitted with a Parshall flume measuring device.

The sludge digestion tank is of the floating cover type. Gas generated in the digestion process is used to heat the sludge and for other purposes. After digestion, the sludge is dried on open beds. The adjacent golf course makes good use of the fertilizer so provided.

The screen and rake mechanism and grinder are by Chain Belt Co.; the two clarifiers and the trickling filter distributor were supplied by the Dorr Co. Pacific Flush Tank Co. furnished the sludge digestion equipment, and the sludge recirculating pump is a Fairbanks-Morse, 150-gpm centrifugal.

Two recirculation pumps and the secondary sludge pump also are of the motor driven, centrifugal type, one recirculation pump being of $1\frac{1}{2}$ mgd and the other 3 mgd; both are Worthington. The secondary sludge pump functions at 100 gpm, and is also Worthington. The only plunger-type pump is the primary sludge pump, which was furnished by R. B. Carter Co. This has a capacity of 150 gpm. All meters are by Simplex Valve & Meter Co., including a Venturi tube on the recirculating line.

The plant is designed to serve a population of 15,000, figuring 100 gpd per capita. Town Manager Rose estimates that the plant now serves some 6,000 people, including a hard-to-measure student population, and that the plant will not be straining its capacity for 20 years. Even so, the plant is so designed that its major elements—the two clarifiers and the trickling filter—may be duplicated on the other side of the control house, the necessary pipe fittings already being provided.

Sanitary Land-Fill Operations in Maryland

A trench-type sanitary land-fill was established by Greenbelt, Md., last year. This operation is of considerable interest in that a light track type tractor with a front-end loader is used for compacting and covering the refuse. Heavier equipment is used to open the trenches and the excavated material is stockpiled nearby where it is available for cover, using the light equipment. An average of 960 cubic yards of refuse per month was disposed of at this site at a cost of \$0.32 per cubic yard. The estimated population of Greenbelt is 7,076 persons which makes operation of the sanitary land-fill cost \$0.51 per capita per year.

At Annapolis the sanitary land-fill established in 1951 was used for refuse disposal. This land-fill is operated as an area-type fill as the site used is in a deep ravine. Earth for cover is obtained from the adjacent hillsides.

The County Commissioners of Montgomery County operate a sanitary land-fill near Rockville to serve that community and adjacent rural areas. It is estimated that 27,573 tons of refuse were disposed of at this site in 1952 at an operating cost of \$16,000, not including land cost. The cost per ton of refuse disposed of was \$0.58.

The sanitary land-fill operation at Baltimore's Herring Run Park site was used to dispose of 205,794 tons, or 776,563 cubic yards, of refuse during the year. The material consisted of mixed refuse, market refuse, street dirt and ashes in the following proportions: mixed refuse (garbage and rubbish) 87.8 percent of the total; market refuse 0.7 percent; street dirt 4.8 percent; and ashes 6.7 percent. Only material collected by the city collection service is deposited at this site. The total cost of operating this facility was \$101,221.87 and the cost was \$0.49 per ton. The area filled during 1952 was approximately 15 acres.

This information is from Maryland's Division of Sanitary Engineering of which George L. Hall is Chief.



● NOT A GOLF hazard, but the Chapel Hill treatment plant adjoins the college golf course.

Pavement Marker Spray PAINTS EQUIPMENT in the WINTER

CARLETON K. RUSH,

City Manager, Vassar, Michigan

WITH a population of approximately 2600 people, Vassar, Mich., has only three full time men in the Public Works Department. However, we found time during the winter of 1953 to repaint nearly all of our equipment, and still not neglect the normal maintenance work required at that time of year.

We feel that this was possible because we had purchased and had available a pavement marking machine. This Meili-Blumberg, model 5 P-R Marker served us very nicely for marking pavements during the summer months and was also used very effectively as a paint spraying machine in the winter. The use of this spray equipment made it possible for us to do the painting of the road machinery for a very low labor cost.

In doing the repainting job one unit at a time was taken out of service. Our heated garage was used as a paint shop and all of the work was done there. The piece of equipment was steam cleaned first to remove grease and dirt and then thoroughly brushed with a wire brush to remove loose paint, rust, etc. Next all of the chrome, wire, rubber and glass areas were masked off. The unit was then sprayed with our standard chrome yellow and finally trimmed in green. Wetting the garage floor before painting greatly reduced the dust problem. Fortunately we had good breaks in the weather and did not get caught with an essential piece of machinery in the shop and partly painted when we needed it in the field. In the spring all equipment was not only repaired and ready for service but looked exceedingly well at very small cost to the tax-paying citizens.

Our regular employees had adapted a machine bought for another main purpose to this special use and accomplished a very creditable job. It was not necessary to work overtime nor did any of the normal maintenance work lag. The job served as a "fill-in" for periods when outside work could not be done or was not necessary. Our major cost for doing this work was the purchase of the paint. We believe that this method of keeping equipment bright and neat is inexpensive, efficient and well worth consideration by any small community.



● AUTHOR (standing) and crew which did the work using the sprayer shown.



● VARIOUS KINDS of equipment were painted by city employees during winter.



A N A R C H I T E C T D E S I G N S

GERSON T. HIRSCH,

A. I. A., Architect
Pleasantville, N. Y.

THIS new all-fireproof building for Pleasantville, N. Y., was designed and constructed to replace a dilapidated barn-like wooden structure, with sheet metal roofing, which had housed the pumping equipment for at least 50 years, and to provide working space for the repair and maintenance activities of the Water Department.

The reasons for undertaking the replacement were numerous. The old building stood too low, and its bottom timbers had rotted and settled as the earth was washed against it. Its windows and doors no longer operated well, making it difficult and expensive to heat. Frequent painting was necessary for mere protection, but failed to make the old barn look any better. Working facilities were dark and crowded, and storage area had become entirely inadequate. No separate space was available for the chlorinator, which had to stand in the pump room, a condition involving some hazard for the staff. Primary factors, however, were the decayed condition of the structure and the fire hazard.

The two electrically driven pumps housed by this building (1000 gpm and 750 gpm capacities) operate alternately, take water from a storage well, and pump it into the Village mains under regulated pressure. The storage well has a capacity of 300,000 gallons, and is supplied by three artesian wells and an emergency connection from the New York City Catskill Aqueduct. The two pumps in the pumping station are horizontal, centrifugal, with a shut-off head of approximately 300 feet. Water is pumped directly into the distribution mains. The water demand of the system is supplied first, and the surplus flows to pressure equalizing reservoirs which have a capacity of 200,000 gallons. Average daily consumption of the Village is 500,000 gallons, with a peak consumption of 800,000 gallons.

As the pumps and their mountings, and the suction and discharge lines were all in good condition, and well located, it was necessary to demolish the old building, and construct the new one overhead, without disturbing them or interrupting their operation. This was accomplished by constructing a series of fairly weathertight low plywood enclosures within the old building, and these stayed in place until the roof was on the new one.

Although the total area of the new building (2440 square feet) is only 20 percent larger than the old one, it provides considerably more usable space for present and future needs. The equipment room is dimensioned to allow for future conversion to diesel power if the fuel price ratio should make this change desirable. The meter testing and repair shop includes a naturally lighted work bench with racks, test tank, and wash sink, as well as ample storage bins for new meters, parts, valves, and fittings. The high windows leave lower walls free for mounting tools and gauges. A sound-muffling phone booth is centrally located here.

Garage and Storage

The garage, to the east, takes the larger truck, and also provides storage for hydrants, large valves, coils of tubing, and other heavy or bulky items, which can be loaded right there. One corner of this unit provides the chlorinator room, separately ventilated, and accessible from outdoors. At the west end, the storage room, which has an 8-ft. roll-up door, can serve alternately as a garage for an emergency pick-up.

The materials of the new building, both inside and out, were selected for economy of construction and



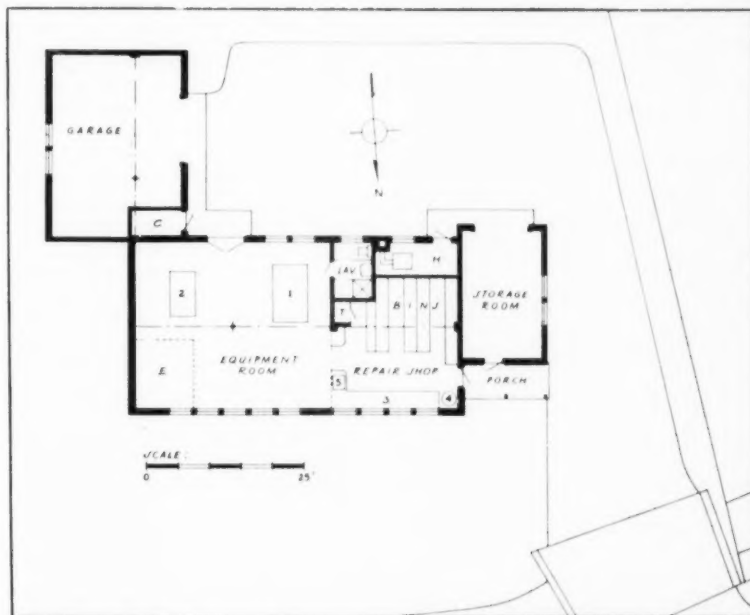
● NEW PUMPING station at left, replaces the old structure shown above. Using only a small amount of extra floor space, the architect provided more usable space.

A NEW PUMPING STATION

reduction of maintenance. Light weight, light colored concrete blocks require no painting or special care. (Blocks stacked vertically for external appearance are reinforced in alternate course joints with high tensile steel.) The ceiling, of pre-cast, long-span concrete planks, is also used in its natural finish. An overhead electric conduit is concealed in the roof planks. Only a minimum of structural steel, steel security sash, and wood doors require surface protection. Wide roof overhangs reduce the wearing effects of weather, and permit windows to stay open in most rainstorms. Heating is by a forced one-pipe hot water system, with oil burner. Lavatory and shower facilities are included. Exterior sheet metal work is lead coated copper.

A Non-Industrial Effect

Since the pumping station is located near the street in a generally residential section, a lapse from stark economy was thought justified, to the extent of facing the center unit with red brick, and including a small entrance porch with round steel columns, flagstone floor, and aluminum lettering on one wall. Marine blue paint on windows, steel members, and garage doors adds a pleasant color accent.



● FLOOR PLAN: C is chlorinator room; H heater; T telephone booth; E electric equipment enclosure. Nos. 1 and 2 pumps are indicated. Work bench is at 3; testing tank at 4; and the washing sink is shown at 5. Garage includes storage space.

These minor embellishments, combined with the projecting roofs, result in an agreeable non-industrial effect, suggesting a school or clubhouse, or perhaps a contemporary residence.

This building was designed and supervised by my office, in association with the Village Engineer, George R. Smith, and was built by the Fusillo Construction Co. for the total bid price of \$30,357.

Restoring the SERVICEABILITY of CONCRETE PAVEMENTS

M. W. FISHER,
Maintenance Engineer,
Wisconsin Highway Department

DURING the decade between 1921 and 1931 more than 3,000 miles of concrete pavements were built on the State Trunk Highway System in Wisconsin. By 1935, some of these earlier pavements began to show distress to the extent that various methods of restoring their serviceability were considered. As a maintenance-betterment program, the resurfacing of old concrete pavements with road-mix bituminous mats was initiated.

Among the earliest of these jobs was the resurfacing of a part of U. S. 41 in Winnebago County. This section was built with crushed limestone, at the rate of 1,000 cubic yards per mile, mixed with about 18 gallons of Type RC asphalt per cubic yard. Mixing of the bitumen and aggregate was accomplished with motor-graders and the total cost of the work was \$15,500, or about 30 cents per square yard. This surface has been sealed with Type RC asphalt three or four times since it was built and is at present in fair condition after 17 years of service.

By 1941 about 100 miles of this type of resurfacing has been done with maintenance forces. During the war years all types of highway work was held to a minimum in order that all available materials and manpower might be concentrated on the war effort. Highways were considered expendable. It became increasingly evident, however, before the end of World War II, that the program of concrete pavement resurfacing would have to be accelerated if many miles of badly broken surfaces were to be salvaged. By that time a considerable mileage of concrete was 20 years old, or older, and had reached the stage where maintenance costs were excessive to



● TYPICAL EXAMPLE of cement concrete pavement in use for many years.

keep them in a passable condition.

By the end of the 1948 maintenance and construction season, about 800 miles of old concrete pavement had been covered with road-mix bituminous mat. The greater portion of this work was performed by day labor methods with maintenance forces.

Road mixing with motor-graders continued to account for the greater share of the work. However, in a few instances counties had purchased travel plants and some of the work was performed by this method. (Practically all maintenance work in Wisconsin is performed with county-owned equipment operated by county hired personnel. The state supervises the work and reimburses the county at hourly rates for machines and men, agreed upon in advance of the work).

During this period tar and RC cut-back asphalt were the principal types of bitumen used, although some MC, and in a few cases, heavy SC road oil was used. The cost of the work averaged less than \$5,000 per mile.

A typical mile of road-mix resurfacing of old 20-foot concrete pavement utilizes 1,000 cubic yards of aggregate at a cost of \$1.60 per cubic yard, placed in a windrow on the

road. Bitumen costs about \$2,500 per mile, including heating and applying. Mixing, shaping and rolling averages \$600 per mile. Shouldering and incidental work amounts to about \$300 per mile. The cost of individual jobs vary somewhat, depending upon the cost of the aggregate and the amount and type of bitumen used.

A few construction projects for the rehabilitation of old pavements were initiated soon after the close of the war. Some of these were road-mix type and some were asphaltic concrete. The full effects of the damage due to heavy traffic and old age soon made it apparent that even extra heavy maintenance programs could not be expected to keep pace with the destruction and deterioration of many miles of pavement annually.

Resurfacing with asphaltic concrete became accepted as an economical, convenient and satisfactory means of salvaging old concrete pavement. At the end of 1952, 785 miles of rough and broken concrete pavement had been resurfaced with asphaltic concrete and 577 miles of road-mix mat over old concrete still remained in service.

The primary objective of pavement resurfacing is to improve rid-

ing qualities and to retard surface deterioration. In most cases these construction projects consisted of two courses of asphaltic concrete, totalling about three inches in thickness placed directly on the old slab. This type of construction was used where the old slab was not subject to rocking or pumping. Where there was evidence of rocking or pumping slabs, a lift of selected crushed gravel or crushed limestone was placed over the entire roadway. This lift was primed and surfaced the specified width with asphaltic concrete.



● SAME CONCRETE pavement after resurfacing with asphaltic concrete.

In most cases the concrete pavements that require resurfacing are too narrow. Widening of these narrow pavements may be accomplished by different methods. The two most commonly used in Wisconsin are widening with so-called "Black Base" or with regular Portland cement concrete. Either can be placed directly in the prepared trench at sides of the slab without the necessity of setting forms. The resultant widening without forms has proven satisfactory in finish and alignment and has been built at a considerable saving in construction costs.

In most cases widening is done on both sides of the old pavement, because of the existing cross-section and right-of-way widths. In some cases, however, additional right-of-way is secured and the widening is placed all on one side. This type of design makes it possible to reshape the entire roadway cross-section. The roadside ditches are restored; small drainage structures are replaced where necessary; and narrow culverts and bridges are widened to accommodate the wider surfacing required to meet present day traffic demands. In practically all cases the shoulders are surfaced with crushed rock or gravel the entire length of

the project. Sections of highway rehabilitated in this manner present a pleasing and satisfactory appearance.

During the 1952 season about 245 miles of old concrete pavement were resurfaced with asphaltic concrete by construction projects and 44 miles of road-mix and "hot-mix" were placed by maintenance forces. The 1953 program provides for the resurfacing by construction projects of about 170 miles, while maintenance forces will place approximately 28 miles.

The work to be done under maintenance consists largely of short stretches, part of which will be the usual road-mix type; a small mileage will be built with county owned hot-mix plants. Generally, the maintenance resurfacing is confined to the lesser travelled highways and the higher type of resurfacing built under the construction program is placed on the more heavily travelled routes. As previously indicated, bituminous concrete is placed directly on the old concrete slab, if the same is not subject to rocking

or pumping. If pumping is evident, a lift is placed over the entire roadway width prior to the construction of the bituminous mat.

The following might be considered typical of each of these two methods of resurfacing: On a 17.2 mile section of U. S. Highway 12 in Dane County, the principal items of the contract are as follows: Aggregate for lift (Base Course) 25,000 cubic yards; bituminous material for surface course 3,400 gallons; bituminous material for prime coat 3,400 tons; bituminous concrete pavement 56,900 tons; and patching concrete pavement 900 square yards. Megarry Brothers, St. Cloud, Minnesota, submitted the low bid in the amount of \$481,394.00. Completion is set for late 1953.

While this project generally provides for the mat to be placed directly on the old slab, it is noted that 25,000 cubic yards of lift material is proposed. This will be used on locations where "rocking" slabs are present. The job when completed will provide a 22-foot asphaltic concrete surface with a 4-foot gravel shoulder on each side.

In some locations along the project vertical and horizontal alignment are not entirely satisfactory since the grade and pavement were built in 1927 and 1928 to standards then acceptable. Otherwise the work should afford many years of fairly comfortable and satisfactory traffic service.

Another project on S. T. Highway 57 in Calumet and Brown Counties consists of placing a lift and asphaltic concrete resurfacing over 9.3 miles of concrete pavement built in the early 1930's. The principal items of the contract to the low bidder, John F. Bloomer Company, Appleton, Wisconsin, are: Aggregate for

(Continued on page 125)



● THE ROAD MIX method of resurfacing was used on much of the early work. A motor grader is laying out the mixture of bituminous material and aggregate.

FIRE PROTECTION FOR A

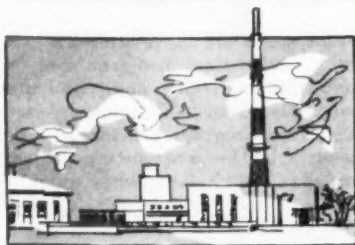
WALTER E. MORGAN,

Manager, Industrial Department,
Walter Kidde & Co., Inc.

WITH the completion of its new sludge drying plant, Baltimore will start a more economic method of waste disposal with an end product salable as a fertilizer base. While the new \$2,100,000 drying plant is in limited operation, it will be some time before capacity production of fertilizer base begins.

Construction of the plant was started in 1951. It was designed by Whitman-Requardt & Associates and constructed by Chesapeake Contractors, Inc. Its mechanical equipment was furnished by Combustion Engineering, Inc. The new plant will process forty to fifty tons of fertilizer a day.

Filtered sludge, with about 75 percent moisture, is carried on a belt conveyor into the plant where it is fed into three cage mills. Simultaneously, air, heated to approximately 1,000 degrees F. is blown into the cage mills to dry the sludge. Sus-



pended in the hot gas, the sludge passes through ducts to cyclone separators. There the dried material drops from the bottom of the separators and the hot gas is exhausted from a 350-foot high chimney, one of the tallest in the Central Atlantic states.

Then the dried sludge enters a cooler on a conveyor belt, is screened to remove large or foreign matter, and is dumped into one of three storage bins having a combined capacity of 500 tons.

The sludge presents a serious fire hazard as it is highly combustible. Should fire occur either while the material is being processed or while it is in the bins, not only might serious damage be done to the valuable plant and its equipment, but production would halt and the lives

of the fourteen men working in the plant might be endangered.

To guard against these possibilities, working with the contractor Walter Kidde & Company Inc. engineered fire extinguishing equipment for the danger areas. The system employs carbon dioxide and covers the cooling and screening equipment, ducts, and storage bins.

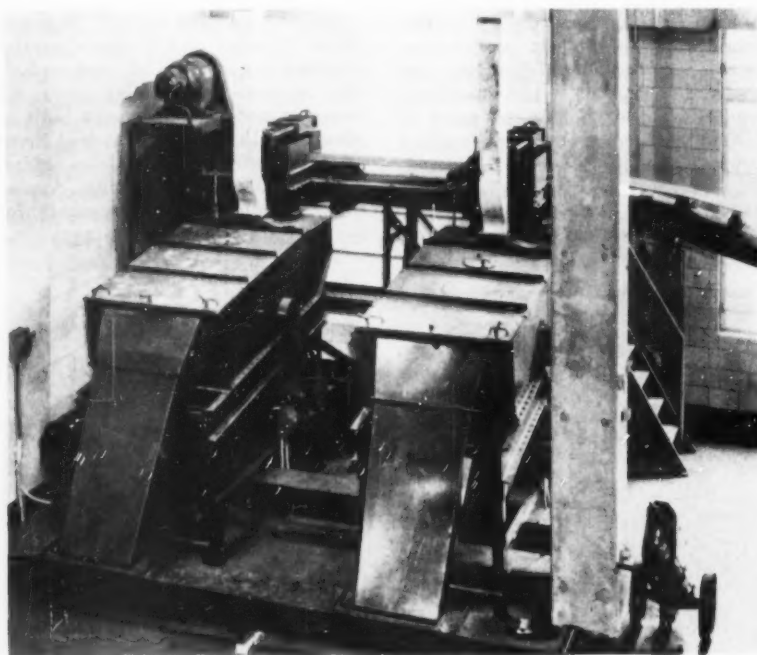
The fire killing agent is stored in fifty-six 75-pound cylinders situated on a protected, outdoor, loading platform. They are arranged so that twenty-eight cylinders are expended as the primary charge for the bins, while the remaining twenty-eight stand as a reserve. If fire flashes in the production equipment or ducts, only seven cylinders of the primary charge are actuated with a similar reserve supply available.

The system is controlled electrically from a panel in the primary room of the drying plant and can also be actuated manually by pull boxes at the cylinders. The panel contains two sets of controls—one to actuate the duct-machinery part of the system and the other for the storage bins. Each set has electrical switches for both the main charge and the reserve, in addition to levers which position directional valves. The system is self monitoring and has green lights which indicate that power is available to operate the system and red lights which appear if a bank of cylinders has been discharged.

If a blaze occurs in the duct work, for example, station employees simply throw the switch for the appropriate "main charge" and turn the clearly marked lever. Carbon dioxide from seven 75-pound cylinders passes through piping and is discharged into the ducts and operating machinery from Multijet nozzles flanged into the apparatus. By reducing oxygen to a point insufficient to support combustion, the fire is smothered in seconds. Simultaneously, the flow of the gas through the piping throws two pressure operated trips which causes two duct air intake vents to close.

Storage Bin Protection

Perhaps the most interesting feature of the installation is the protection for the storage bins. Usually, when materials of a carbonaceous nature are stored in large quantities, and it is not absolutely certain that



● SCREENS ARE 12 ft. high, dwarfing the 100-lb. carbon dioxide wheeled unit at the right, bottom. Screens segregate large or foreign matter from the dry sludge.

SLUDGE DRYING PLANT

all of the material is completely dry, thought must be given to the possibility of spontaneous combustion.

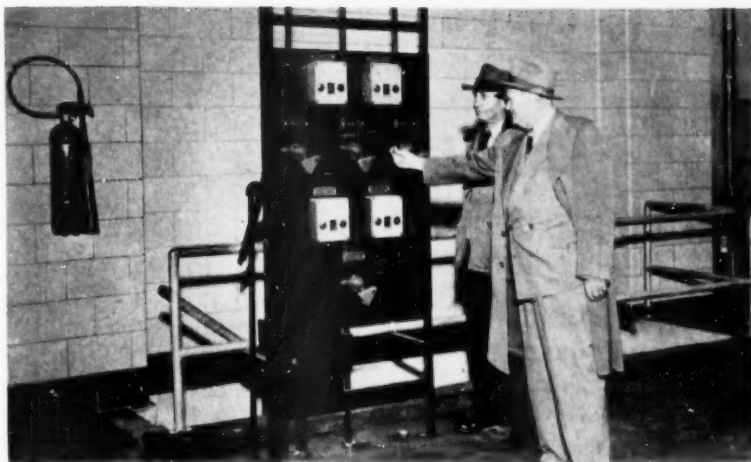
This was one of the problems that the engineers considered when they designed the fire extinguishing system for the sludge storage bins. Installation of thermocouples which are tied into an indicator panel provide a means of detecting any undue heat conditions. Upon noticing a raise in temperature at any spot in a bin, the plant operator can do one of two things.

First, he can discharge carbon dioxide into the appropriate bin from the battery of storage cylinders by means of an electric switch and a manually-operated direction valve. The gas is discharged from specially designed frangible disc-type nozzles to guard against the possibility of any sludge clogging the orifices. The piping-nozzle arrangement throughout each bin permits carbon dioxide to be discharged at four different levels. The first level is at the top of the bin; the second, eight feet below; the third, sixteen feet below; and the fourth, twenty-four feet below. In this way complete saturation of the inert fire smothering gas is achieved throughout any bin.

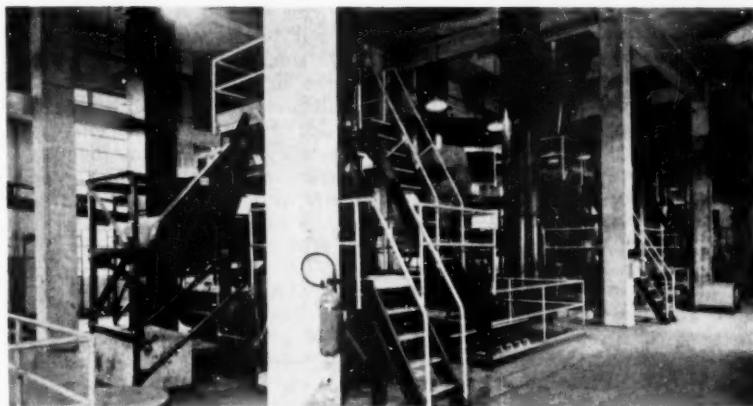
His second choice is to locate the "hot spot" in the material and eliminate it. To do this he turns on a rotating conveyor which draws material from one bin and transfers it to another. With this method he discharges carbon dioxide into the second bin as a precautionary measure. As the "hot spot" moves from bin "one" toward bin "two", the thermocouples follow its path and indicate how close it is to coming to the discharge end of bin "one". As it is about to be discharged, by means of a lever, it is dumped on the ground. This eliminates the "hot spot" with very little loss of the fertilizer base.

The circulation of the material from bin "one" to bin "two", which is filled with carbon dioxide, eliminates the possibility of a recurrence of a smoldering fire. The gas would instantly snuff out any spark which got past at the time of dumping the material on the ground.

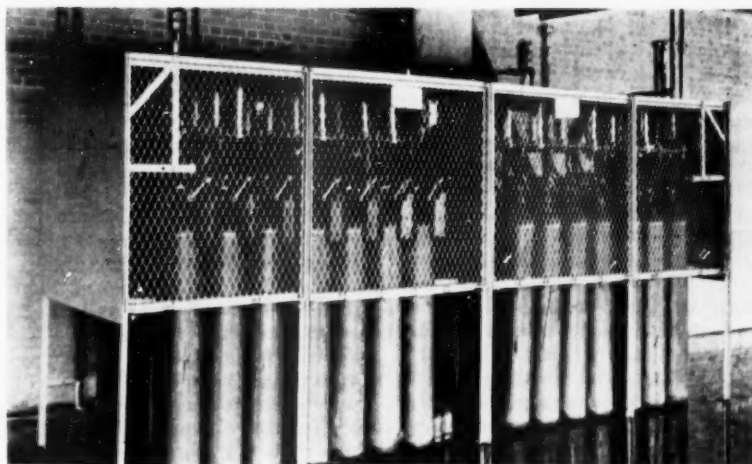
Baltimore's new plant is under the general direction of Paul L. Holland, Director of Public Works, and John J. Hunt, Sewage Engineer.



● HOW IT WORKS is explained by Harry Fried to Engineer H. E. Burton.



● MAIN ROOM of the plant, showing the three cage mills and CO₂ portable units.



● ON A protected out-door loading platform are fifty-six 75-lb. CO₂ cylinders.

EVANSTON'S Engineered TRAFFIC SAFETY

PHIL HIRSCH

WHEN Evanston, Ill. was named the safest city in the country early this year, the traffic engineering department received a sizable share of the credit.

The department, headed for the past 17 years by Z. A. Faulkner, had already received several pats on the back. Of the six citations which have been awarded by the Institute of Traffic Engineers, Evanston has received five. These safety commendations are among 27 the community has received since 1930, in itself a record unsurpassed by any other town or city in the country. Evanston has won the grand award of the National Safety Council four times.

The best way for a traffic engineer to make himself unpopular with the motorist, Faulkner believes, is to put up too many stop signs. Evanston's traffic engineer dishes them out parsimoniously, but makes sure those that do go up are in the best locations. As a result, the safest city in the country, with a 1950 population of 73,000, has less than 50 stop signs within its corporate limits.

Before a stop sign goes up in Evanston, the location must satisfy three tests. First, there must be a serious obstruction blocking sight of traffic on one street from motorists driving on another. The obstruction must be permanent, such as a store wall, rather than something that can be removed easily, like shrubbery.

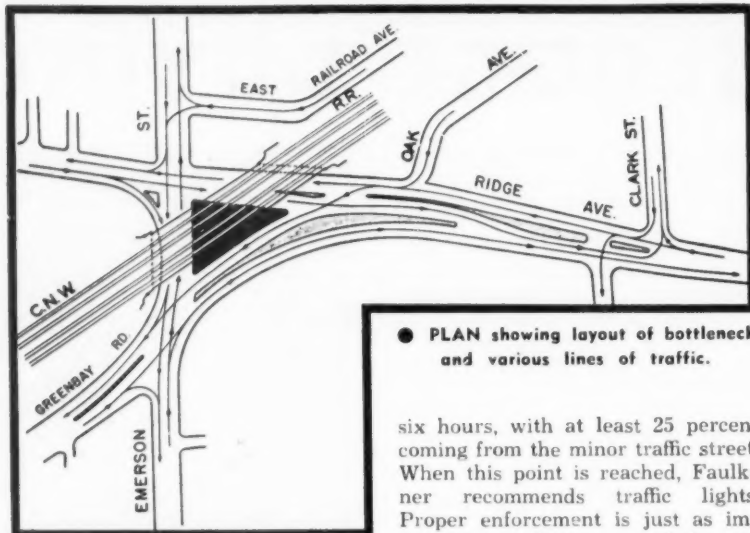
In Evanston the shrubbery problem has been eased considerably. Since 1941, property owners have been required to trim any shrubbery which obstructs a view of traffic signs. The ordinance reads as follows:

"The owner or occupant of every lot . . . adjoining a street or alley intersection . . . upon which any trees, shrubs, or plants are growing shall trim . . . the same so as not to obstruct the passage of light from any street light or traffic signal light, and so that the same shall not interfere with, nor obstruct, the vision of persons using the alleys, streets, or highways." Anyone who doesn't obey the ordinance within five days after notification is subject to a fine of from \$10 to \$100.

Every permanent view obstruction doesn't automatically get a stop sign in Evanston, only those where a driver must slow down to less than 10 miles an hour to navigate the intersection safely. Otherwise, "slow," or "dangerous crossing" signs are installed.

The second stop sign test involves accidents. As far as Evanston's traffic engineer is concerned, a stop sign isn't required unless there have been at least three angle-type collisions at the spot during the previous 12 months. He feels that this is the only type of accident in which the sign is always required. And before the stop sign is installed, Faulkner likes to prepare the motorist by erecting the "slow" or "dangerous crossing" signs first.

Traffic at the stop-signed intersection must consist of at least 250 vehicles an hour during a six-hour period. This means total traffic passing through the intersection on both streets, not just on one. Depending on vehicle volume, either a two-way or a four-way stop is created. The ceiling on the traffic volume requirement is 1,000 cars an hour for



six hours, with at least 25 percent coming from the minor traffic street. When this point is reached, Faulkner recommends traffic lights. Proper enforcement is just as important as judicious use of the stop sign. In Evanston, after a new stop sign is installed, motorists are given a few weeks to learn about it. Then police are asked to patrol the intersection.

Although Evanston's vehicle registrations zoomed from 17,118 in 1947 to 23,625 in 1952, the parking problem has eased considerably, primarily because citizens and officials think alike on the matter. The city has seventeen off-street parking lots. But an even better illustration of how everyone is pulling together to solve the parking bottleneck is an ordinance passed last year by the city council. This law requires that a minimum amount of off-street parking space must be provided with all new construction.

The number of spaces are specified for each type of building. For example, a single-family dwelling unit on a lot containing 7,200 square feet would have to have two spaces. If the house contains lodging accommodation, an additional space for each two lodgers must be provided. Other sections of the ordinance prescribe: one space for each five students at institutions of higher learning, one space for each three rooms at hotels or apartment hotels, one space for each 300 square feet of area in a store or office building, and one space for each six seats in a theater. Requirements for a variety of additional types of buildings are included in other sections of the ordinance.

Among the 17 off-street lots are two which have been tailored to solve specific problems. One of these, at Sherman Ave. and Lake St., near the central business district, is divided between rental space and 10-hour meters. This lot

was built after a survey by the Evanston planning commission. Questionnaires asking downtown Evanston workers their parking preferences were mailed to 5,000 workers employed by 891 firms. Of the total, 995 questionnaires came back, representing 137 firms, among them, all retail stores.

The answers, although comparatively few, were regarded as an indication of the minimum number of all-day parking spaces required. About half of the persons who answered the survey said they parked on the street (most of the rest used existing off-street spaces). The largest group said they would pay up to 25 cents a day for all-day, off-street parking. The survey indicated that two or three blocks was the maximum drivers would be willing to walk after storing their autos. After the survey, the Sherman-Lake lot, two blocks from the center of town, was selected as an all-day parking site. Sixty five of the 170 spaces have been set aside for rental parkers. These drivers pay \$18.75 every three months for each space (about 21 cents a day for an average three-month period). The record is kept straight by giving each renter a sticker, which he places on his windshield. Large signs on the lot warn outsiders that their vehicles will be towed away. Faulkner reported that there has been little difficulty enforcing the plan.

The rest of the space in the Sherman-Lake lot has been fitted with ten-hour meters. These, like most of the other meters in town, provide space at a rate of 12 minutes for a penny. The ten-hour limit is designed specifically for the woman shopper who drives downtown for an all-afternoon shopping expedition with side trips to the beauty salon and perhaps to a movie. Anyone using the ten-hour meter can buy as little as an hour's space at a time.



● WEST SIDE of intersection of Green Bay Road and Emerson St. which is to be remodeled soon.

The only exception to the 12 minutes-for-a-penny meters is in a lot in the southeast section of Evanston, in a multi-story residential area. Here, specially-designed Park-O-Meter equipment has been installed, with a 16-hour limit. The charge is a penny an hour. The idea is to provide off-street space overnight for residents of the apartment buildings. The lot stands on the site of what used to be a wholesale flour and feed store, adjoining a commercial area devoted mainly to automobile sales rooms and used car lots. This location has reaped unforeseen dividends. During the day, when the apartment dwellers are away, auto mechanics, salesmen, and shoppers use the lot. Open only a year, about 80 percent of the 48 spaces are being used currently, much of this 80 percent on a 24-hour basis.

Although parking is a big part of the traffic engineering job in Evanston, accident prevention is probably the most important duty. Faulkner keeps the previous 12 months' accident experience before him with the aid of a large map, similar to the selective enforcement maps used by many police departments, including Evanston's, where the idea originated.

When three accident pins appear at any one location on the map, Faulkner is ready to go to work. First, he digs out the accident reports to learn the vital facts of each collision. Among the important con-

siderations here are: the time of the crash, the type of accident (auto-auto, auto-pedestrian, etc.), vehicle speed and direction, and the location in reference to curb lines and traffic signs. Usually, after poring over these accident reports, consulting the map, and visiting the accident scene, Faulkner is able to come up with what he calls a "common denominator"—a basic reason why the accidents happened in the first place.

Some of these common denominators have turned out to be rather unusual. For example, several years ago, the intersection of Green Bay Rd. and Central Ave., at the north end of Evanston, was causing a lot of trouble. During the 12 previous months, there had been about 30 accidents, some involving injuries. A peculiar thing about the accidents was that they had all occurred late in the afternoon and all had involved east-bound traffic. Faulkner hopped into his car about 4:30 one afternoon and drove east through the troublesome intersection. He had the answer to the problem in short order. He found that the late afternoon sun made the traffic signals at Green Bay and Central a blind spot for east-bound motorists. Coming through the intersection, these drivers couldn't tell whether the light was red or green, because sunlight was reflected from the lenses. Non-glare lenses were installed, and the size of the lamps inside the traffic signals was increased from 25 to 67 watts. The accident problem became virtually non-existent immediately afterward.

● PARKING METER providing for 16-hour service in parking lots.

Disposal by

SANITARY FILL Costs 77.4 Cents per Ton

C. E. WRIGHT

UP to five years ago the city of Gainesville, home of the University of Florida, burned its garbage in open areas on the outskirts. The odor was bad and brought much complaint from residents. Then a sanitary fill was started, which has proved both economical and efficient besides serving the dual purpose of reclaiming low land for recreational purposes and getting rid of a breeding place for mosquitoes.

The old fair grounds, a 20-acre city-owned property on the eastern edge of the city, partly used as a recreation area, was selected for the fill. Within the first two years 2.92 acres had been filled, with sufficient compaction so that the area could be used for a soft ball playing field. After two years of use there was very little settlement of the ground; and there have been no rats, no flies and no mosquitoes.

So successful, in fact, has been the Gainesville method of operation that some months ago students attending a short course on sanitary engineering at the University of Florida were taken to the fill to observe the workings; and, moreover, the Florida State Board of Health points to it as one of the best of such garbage disposal operations in Florida, where heavy summer rains and high temperatures for many months add complications to the sanitary fill method of disposal.

In planning the Gainesville fill, City Engineer R. B. Sensabaugh arranged for digging deeper trenches than is the ordinary practice. The usual depth at Gainesville is 6 ft. but occasionally, when soil conditions suggest the advisability of deeper excavation, the ditches are put down to 8, 10 or even 12 ft. All are arranged in a terraced formation. In a 6-ft. ditch garbage is deposited to a depth of 4 ft. and then covered with a 2-ft fill. In deeper ditches the proportions are similar. After compaction, each cubic foot contains 35½ lbs. of garbage.

Every weekday morning at 7 o'clock a Link-Belt dragline with a ¾-yd. bucket begins ditch digging,



● TRENCHING is by Link-Belt dragline; compaction and covering by tractor-dozers.

so that by the time the first garbage trucks arrive they can be unloaded without delay. The last load is scheduled to arrive at 4 pm, after which a Caterpillar D 7 tractor is run over the fills for compaction and the garbage is covered. Further compaction is obtained as trucks on subsequent days back up over the fills. It has been found that cardboard boxes and paper with the garbage aid in getting the required degree of compaction and density. All other trash, such as tree branches, leaves, grass, etc., is hauled by other trucks and burned in another location.

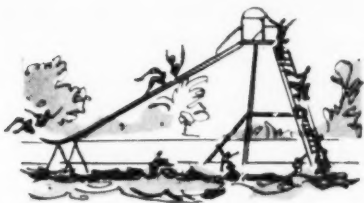
Average weekly garbage collections in Gainesville, a city of 26,861 residents (not counting students at the University of Florida, which has its own sanitary arrangements), are 389,783 lbs. This is gathered by six Gar Wood Loadpackers and two open-body trucks during a 5½-day week. Daily collections are made in the business district, two or three collections a week in residential areas. The city has 6400 garbage accounts, of which 283 are business places with six collections a week, 3477 are residential with two collections and 2640 are residential with three collections. Residents do not elect whether to get two or three collections a week; that decision is made by the city engineer's office based on population. The more sparsely settled districts get only two collections.

The average cost per pick-up is

11.55 cents; the cost per person per year for collection is \$3.705; and the cost per ton collected is \$9.82. The amount of garbage per person per year is 754.6 pounds and the average pick-up is 23.52 pounds. Total cost of collection is budgeted at \$99,517. Disposal costs for the past year were \$7844, a cost per ton of 77.4 cents and per person of 29.2 cents. There were 861,744 pick-ups in 1952, producing 10,131 tons of garbage.

Fees for garbage service appear as a surcharge on light and water bills, these utilities being operated by the city. Business places, with six collections a week, are charged \$12.50 a month for 188 cu. ft. a week; residences, with three pick-ups a week, pay \$1 a month, and those with two pickups weekly pay 50 cents a month. These charges cover about 75 per cent of the total cost of operating the garbage service, the remainder coming out of the city budget.

With most of the available land at the city fair grounds now having been used for garbage fill, the city government of Gainesville is seeking other property that can be similarly used with benefit both to the property itself and the city. Low-lying, mosquito-breeding marshlands, which are commonly found near Florida cities, are considered to be particularly desirable for garbage disposal operations as two birds can be killed at one and the same time.



NORMAN R. MILLER,

American Playground Device Co.

DURABILITY, safety, good design and economy are important factors to consider when selecting swimming pool equipment. The kind of economy that pays off lies in installing the kind of facilities from which you may expect years of trouble-free service. You cannot go wrong, for instance, if you select diving units that meet the official requirements of the AAU and NCAA.

Conventional equipment at hundreds of pools is the one-meter diving unit. It should be constructed of hot-dip galvanized steel pipe, with the frame locked rigidly together by malleable fittings and bolted through the pipe members for greater strength and durability. Hot-dip galvanizing gives the metal enduring rust protection.

For pools where the walk areas are limited, an extra heavy duty regulation one-meter diving unit of the streamlined type is recommended. The frame, supports and guard rail assembly should be constructed of larger pipe, preferably 2 3/8 inches in diameter. For resort hotels, country clubs and spas, where all accessory equipment must have architectural beauty, the one-meter diving unit should combine graceful, streamlined design with extra heavy duty construction.

The streamlined three-meter diving unit should consist of a frame, main braces, stairway and risers of hot galvanized steel pipe, preferably 1 7/8 inches diameter. Counterbracing of heavy, cold-rolled flat steel bars and cantilever construction add durability. All stairways should be slanting, with non-slip treads and safety handrails.

For larger pools, triple diving units will provide for greater usefulness. This equipment should include one official three-meter and two one-meter units, fan-shaped to assure safety for the divers. One official

Good Equipment for The Swimming Pool

16-foot and two 14-foot diving boards are recommended for the triple diving unit. AAU and NCAA official regulations require diving boards of 14 and 16 feet, each 20 inches wide, 3 inches thick at the base and tapering to 1 1/2 inches at the diving tip.

Proper selection of diving boards will greatly reduce maintenance work and expense. A type which gives years of good service is the regulation board of solid laminated construction. Top grades of clear, 100 percent flat, dense grain, old growth Douglas fir must be carefully selected for moisture content and texture. Each of the 12 laminated sections comprising the board must be surfaced, planed and sanded

to assure perfect joints. Laminated sections then should be matched and permanently welded together, using a special glue. The boards should be treated with a sealant which seals in the proper moisture content essential to assure the flexibility and resiliency required in official boards.

Springboard units are ideal for installation whenever official regulation diving units are not required. The springboards are made in 12-foot lengths, with 15, 18 and 20-inch widths. Complete units are equipped with strapdown fulcrums and necessary fittings and anchors for installation on either a concrete or wood dock.

Here is how to insure better per-



● THRILLER slides make a big hit. This is a view at the Dearborn municipal pool.

formance and maximum service with your official regulation diving boards:

Install your boards properly. First, make sure that all members of your diving stand are properly aligned and that your fulcrum is aligned and perfectly level with the floor. Second, locate your fulcrum correctly: For a 12-foot board, a distance of 6 feet from the anchored end of the board is recommended; for a 14-foot board, 6 to 7 feet; and for a 16-foot board, 8 feet. Finally, make sure that the base of the board and the fulcrum are aligned and perfectly level; then, bolt the base of the board securely to the stand.

A regulation-style fulcrum is desirable. Either a standard bar-type or a rocker-type fulcrum will assure good diving board performance, providing the fulcrums are properly designed and covered with a heavy thickness of live rubber to absorb the shock of the board when in use. The rocker-type is recommended, however. Curved to follow the action of the board and heavily covered with a resilient rubber cushion, the rocker fulcrum distributes the weight and strain evenly over a large bearing surface, thereby giving a better and longer board performance.

The board should not be secured at the fulcrum. Official regulation diving boards are designed to rest free at the fulcrum point, not bolted or strapped down. Fastening boards at the fulcrum will destroy much of the "spring" and will cause excessive breakage.

In operation, insist that boards be used wisely. Only one diver should be allowed on the boards at one time. Further, needless bouncing, jumping and springing on the boards should be prohibited. Only three steps and one jump are required by the experts in championship running dives.

Diving boards should be alternated regularly. After one board has been in service for four or five weeks, take it down, remove the cocoa matting and place the board right side up in a normal 70-degree temperature room, resting it levelly on "two by fours" placed under each batten. Scrub the board clean with soap and water, and permit it to rest and air-dry for ten days or so. Then, paint it with boiled linseed oil and rub it dry before placing the matting back on the board; or, if the board is finished in spar varnish or white enamel, simply apply one coat of the original finish and

let it dry before replacing the matting.

Increased safety is assured by covering boards with extra heavy duty cocoa matting, which is a specially woven imported fabric. It is the approved regulation covering for diving boards and springboards, and is also desirable for use as runners, wherever wet or waxed floors present a slipping hazard.

Another important safety accessory is the lifeline, which is available with floats of Tenite plastic. This new material is far superior to wood, cork or balsa. Floats should be five inches in diameter and nine inches long, and spaced five feet apart on the line. Line lengths run up to 1,200 feet. Rope ends should be equipped with heavy, cast brass fittings for securing lines to wall anchors.

Other Equipment

Pool ladders should be roomy and equipped with non-slip treads for added safety. Non-rusting ladders entirely of metal are recommended. An approved type has risers spaced 12 inches apart, with the top tread 12 inches below walk level. While rigidly anchored to pool walk and wall, ladders should be equipped with special lugs for easy removal.

Lifeguard chairs should provide an unobstructed view of the deep-water areas. Their use minimizes patrons' conversation with the guards, assuring greater alertness. Frames of hot galvanized pipe and platform and seat of Oregon fir and hardwood, finished with enamel, are recommended. The height should be six feet to the seat, and seven and a half feet over-all.

Safety and Sanitation

Pool cleaning and sanitation problems may be satisfactorily met with a unit that includes a cleaning tool, pump unit and 50-foot suction hose. Larger pools should add a diving mask to the equipment list, thereby eliminating the necessity of draining the pool—a costly process—and permitting the lifeguard or attendant to work more efficiently with the cleaning unit on the floor of the pool. Use of a diving belt assures maximum safety during the cleaning operation.

Other safety accessories for the swimming pool include lifebuoys and rescue poles.

Water slides provide extra fun for the patrons and stimulate increased attendance and revenue at the swimming pool. The water slide is available in the pool walk and

pool bottom types. Conventional sizes are with chutes 12, 16 and 20 feet long and platforms 6, 8 and 10 feet high, respectively. Chute bedways should be of extra heavy gauge ingot iron or stainless steel, rigidly secured to steel tubing siderails. Strong malleable fittings should lock the chute, platform, safety handrails and supports into an integral unit.

Thriller slides always make a big hit with young and old. Constructed with either 20 or 30-foot steel chutes, they plunge bathers into the water to depths of about three and a half feet at an exciting yet completely safe speed. Safety features should include a spacious, completely enclosed tower platform, non-slip stair treads, slant-type stairway with safety handrails and chute guardrails at the top to permit bathers to position themselves properly before descending.

Where space is available, a swimming pool or bathing beach may add to its pulling power by installing a children's playground, equipped with swings, slides, see-saws, merry-go-rounds and Castle Tower climbing structures.

One of the important factors in the revenue-producing phase of swimming pool operation is the checking system, which safeguards the patrons' clothes and other personal belongings. It is also the method by which swimming pool admission fees are collected. Checking baskets should be strongly built and should be equipped with large number plates with clear black enamel numerals. Companion piece is the checking pin, made of spring brass and heavily nickel-plated, with numbers embossed on the large hood.

Another essential piece of equipment is the steel basket rack which provides compact shelving for orderly and sanitary storage of checking baskets and their contents. The rack should be equipped with padlock hasps and number plates. Good seating is also needed in the dressing room.

Other useful accessories at the pool are beach umbrellas, rubber diving bricks and bicycle racks. The latter make possible the orderly parking of bicycles, thereby eliminating the possibility of accidents caused by patrons falling over them.





METROPOLITAN COUNCIL FORMED FOR TORONTO AND TWELVE SUBURBS

JAMES MONTAGNES

HEMMED in by rapidly expanding municipalities, Canada's second largest city, Toronto, (675,-754 population) has been studying the problem of amalgamation with its suburbs for some years. Following a number of reports the Ontario provincial government has now enacted legislation to form the "Municipality of Metropolitan Toronto" as a first step towards eventual amalgamation of Toronto and its twelve suburbs.

The new metropolitan area encompasses roughly 240 square miles, or 152,000 acres, and a population of 1,118,000. Toronto proper consists of 22,000 acres. Population growth in the suburbs in the past decade has been almost 73 percent; in Toronto population increase has been under 4 percent.

The Municipality of Metropolitan Toronto will have a governing body of 25 members; a chairman appointed by the province of Ontario for the current year, and 24 members made up of the chief executives of each suburb, the mayor and two senior controllers and the leading aldermen from each ward of Toronto. In addition there is a metropolitan board of education of 20 members, 10 from the suburbs and 10 from Toronto. Both these boards have started functioning to work out operating methods for the official start of the metropolitan area legislation January 1.

Under the legislation the super-municipality will have control of assessments, water supply, sewerage, drainage, arterial roads, certain wel-

fare services, planning, public transportation, parks and green belts, and housing. The local municipalities will continue to have exclusive control of police, fire protection, sidewalks, public health and sanitation, financial aid to hospitals, garbage disposal, distribution and sale of electric power, public libraries, licensing, local regulations and by-laws, direct levy and collection of taxes.

Subject to the authority of the metropolitan council, the twelve suburban municipalities and Toronto, would also continue in charge of the retail distribution and sale of water, local sewage connections, local streets, street cleaning, lighting and traffic control, elementary and secondary schooling, public relief and some other welfare services, operation of local jails, magistrate's and juvenile courts, local parks and recreational facilities, public housing and redevelopment schemes, local planning, zoning and subdivision control.

To finance the metropolitan area, annual estimates of revenue requirements will be drawn up and the necessary funds will be obtained from each municipality according to its proportionate share of metropolitan costs. To determine that amount in a fair way, the metropolitan council will supervise, control and finance the preparation of local assessments on a uniform basis.

The 13 municipalities in the metropolitan area will collect the taxes on a rate set by each municipality. Part of this money will go to the metropolitan council for its operations, the remainder for the work of the local municipality. It is ex-

pected that rates will be increased in the suburban municipalities, especially to industries there, since Toronto completed a reassessment of the entire city based on 1940 values in 1949.

With traffic problems one of the major headaches to be solved by the metropolitan council, it has authority over all arterial roads. This means, under Ontario highway legislation, that the province will pay a 50 percent share of the costs instead of a one-third share to the municipalities as till now. New traffic arteries which have been held up by city and suburban red tape are to be handled by the metropolitan council.

Toronto has for over 30 years had a municipally-owned transportation system, which operates some services in the suburbs as well. The city transportation commission is being enlarged from a three-man to a five-man board and will take over all public transportation in the metropolitan area. This means buying out five private bus operators who have in recent years started service to the suburban municipalities. Legislation allows for a fair price to these operators. The new transportation commission will be able to operate within a 25-mile radius of the metropolitan area, and will have jurisdiction over routes, fares and tolls.

The metropolitan council will have parks and planning under its control so that proper facilities can be acquired for laying out, and improving public parks, recreation areas, squares, avenues, boulevards and drives without interfering with

(Continued on page 125)

HAMMOND'S SPECIAL PARKING PLAN

Speeds Up Street Sweeping Operations

A PARKING plan which speeds up street sweeping and greatly increases the area that can be worked by a sweeper unit during a single shift has been adopted by Hammond, Ind. Hammond simply passed a city ordinance permitting parking on the even numbered side of the street one day and on the odd numbered side of the street on the next day. Thus, the sweeper operator has a clear field for sweeping one side of the street clean without skipping areas or slowing down to zigzag around parked cars. On the following day he merely retraces his route of the previous day, sweeping the opposite side of the street which is then clear of parked cars.

City-Wide Campaign

This is just one phase of a well organized city-wide campaign which Mayor Vernon C. Anderson hopes will bring the Northern Indiana city the title of "Cleanest City in the United States" this year. Hammond, which covers an area of 27 square miles has previously won three first places and an honorable mention in its population class during the past five years. Hammond has 321 miles



● MAYOR Anderson aims to have "the cleanest city in the U. S."

of streets, of which 209 miles are curbed streets which are swept every two weeks. Another factor which is increasing both the efficiency and scope of the street sweeping program in Hammond's all-out drive for the "Cleanest City" title, according to Street Commissioner Charles D. McCord, is the purchase by the city of two Mobil-

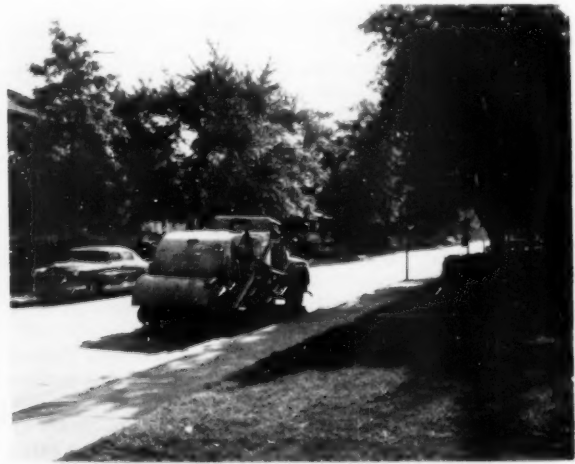
Sweepers, which are fast, four-wheel-type sweepers with large capacity hoppers.

"The enclosed and heated cab of the Mobil-Sweepers has proved to be an important help to us" says Charles D. McCord, Street Commissioner. "They not only allow us to start sweeping earlier in the spring and continue later in the fall but they also keep our sweepers on the job in light rain, which is a big advantage in this area.

"On an average, during the sweeping season, each sweeper will pick up five loads per day. We have many requests for these sweepings and when we have a full load, we dump at the nearest request. If there are no requests, we dump at designated stations within a radius of about three miles of where the sweeper is working. These dump sites are all low and we do not have to haul away. When the material piles up enough to interfere with the sweepers, we send in a grader to smooth out and compact what has been dumped. Our drivers work a 40-hour week and are paid \$1.90 an hour—the same as all our other drivers."



● PARKING is permitted on even numbered side of street one day and the other side the next, providing a clear path for sweeping, without any need for hand work around cars.



● TREE-LINED streets pose a sweeping problem in the Fall. Hammond finds its sweepers very satisfactory for this phase of the city-wide campaign for the "Cleanest City" title.

IF YOU WANT SAFETY IN CONSTRUCTION

Here is how to get it

It is an axiom in safety work that there are only as many accidents and as much time lost due to them as top management permits. Any city or county engineer, water works superintendent or comparable supervisor can, if he wishes, practically eliminate accidents in the operations he directs. If he does not care how many accidents he has, the rate will be high.

Municipal operations lag far behind industry in the application of safety practices. Industry finds that safety pays; it does not want accidents. Now the construction industry is assuming the lead in safety practices. The data in this article are taken from "Confidential: For Management Only" which was prepared and published by the Municipal Contractors Association, AGC, of Dallas, Texas. R. M. Dixon is Managing Director and the committee responsible for the very fine 52-page mimeographed text included Wm. Gill, Jr., Chairman; John G. Holland; R. D. Whittle; and A. J. McKenzie, Jr. In this article we have taken the liberty of changing and condensing the text slightly in places to make it more applicable to municipal operations. There are eight steps:

Step #1. Adopt a policy of safety and put it in writing. This may appear unnecessary, but it is absolutely essential. To have a safety program that will work requires endorsement and support of top management. So if you are for it, let's get it in writing. How you want to put it in writing depends, of course, on your particular operation—how far you want to go, etc. You can, in an informal way, just send down through the channels of supervision a memorandum to the effect:

"In the future I don't want anybody hurt on our jobs. I want our supervisors to learn how to teach our people how to work without getting hurt. I want each person to take enough time and care to do the job right, do it efficiently, but do it safely."

Or you can be more formal:

"It is to be the base of the safety policy of this organization to take

Posters Courtesy
National Safety Council

the permanent and continuing position that no job being performed by any employee is so important, and no service is so urgent, that time cannot be taken by all concerned to perform the job in the right way—the efficient way, which is the safe way."

Word it any way you want it, make it formal or informal, long or short. But put it in writing; and make it clear how top management feels.

Among the first things to do is setting out to your Superintendents and Foremen: 1. That you want this safety program to work; 2. that discretion be used in employing men; 3. that they, the Supervisors, are to set the example for other employees; and 4. that the safety work is not a side issue, not something to be done if they get time, but is a

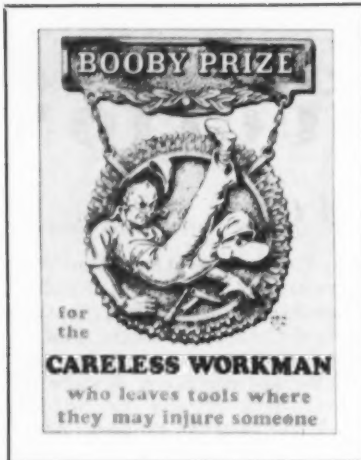


continuing and permanent part of their job.

Step #2. Select and Assign a man to direct the Safety Program. It is essential that the man you select to do this safety direction job be in the executive or administrative group. Give the man the time, the encouragement and the opportunity to acquaint himself with at

least the basic elements of accident prevention in the construction field generally, and specifically in your type of operation. Briefly, here is the job of this man:

1. He will study and analyze the accident records so he will know what the problems are.
2. He will prepare and distribute in writing to all supervisory personnel specific instruction on the anticipated hazards of a job well in advance of that job. If preparing this material is beyond the ability of your safety man, you may need a job safety planning committee to work with him. He may want to contact the Safety Engineering Department of your Workmen's Compensation carrier or write the National Safety Council for literature and training aides.
3. He will equip and instruct superintendents and foremen to give safety orientation talks to all new employees at the time they come on the job.
4. He will equip, train and instruct foremen to hold daily "TOOL BOX" safety meetings. In these meetings the foremen on the job will give safety instructions to the men on the job on the specific hazards of the work to be done that day.
5. He will direct and sell management, superintendents, foremen and other supervisors always to fit the safety program in as a part of the work to be done and not as something separate and apart from the work. His whole philosophy of operation will be, "doing a job safely is doing it right, doing it efficiently and doing it the way management wants it done."
6. His job will include setting up the procedure to do periodic or continuous housekeeping inspection of all areas of work, equipment and materials. These things will be done on a schedule that is practical, and of course must be done with the sincere belief that they can be done profitably. He must sell and convince management,



supervision and employees that the time and materials necessary to barricade, place, stack, clean-up, shore-up and protect, are essential to sound efficiency and profitable production and not just an old man's idea of meticulous housekeeping.

7. His big job in planning the safety program is to see that these things are done on a day in, day out, matter-of-fact basis with thorough cooperation and regularity.
8. Another one of his problems is keeping the links in the chain of supervision from breaking. Safety instructions, like pay-checks, must go all the way down to the man doing the work. He will need to remember that accidents happen at the workman's performance level. So a safety idea, a plan, a memorandum, an outline for a talk, or an order on a superintendent's desk or in his pocket not only won't do your safety program any good, but will eventually cost you money.
10. This man you select to do this job needs always to remember these basic accident prevention principles: (a) Safety is humanitarian: it follows the laws of God and man; (b) Safety can be applied on a profitable basis; (c) Safety works from the top down, and not from the bottom up; (d) Safety must be blended in with the work rather than overlaid as a separate job and function; and (e) Safety is everybody's business every day, and like all other jobs in construction, it calls for hard work from everybody.

You and this man, or your safety committee, need to know the sources

of assistance available for your use in getting your program started and in keeping it going. There are many sources to which you may go for help. Some of this assistance will cost you some money; some of it will be free, but there isn't anything recommended here that is going to cost you very much money.

Step #3. Train him, equip him and help him design the program. Listed here for your information are the sources where you can get help. It should be pointed out that these are not listed in order of importance nor in cost.

1. Your insurance carrier will likely provide you with the services of a trained, qualified Safety Engineer. His normal services and materials will be free. Most insurance companies' safety engineering program works to the general end



of getting you started on a program, getting your man equipped and trained and then encouraging you to carry on from there.

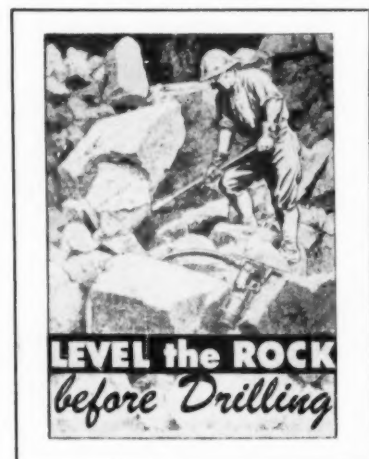
2. You could, if your position justifies it and you feel so inclined, employ a full or part time safety engineer.
3. Quite a few colleges and universities offer Short Courses in Safety Engineering. Some of them provide staffs to do on-the-job safety training for private industry. There is usually a tuition charge, or an hourly fee for this work.
4. Local chapters of the American Society of Safety Engineers in some areas hold regular meetings to discuss mutual problems and some hold periodic seminars on industrial safety.
5. Some local safety councils have an industrial safety program and materials which are pro-

vided on a membership basis. Other local and state safety councils which do not specialize in, or emphasize industrial safety may have helpful materials and services. At least they should be able to tell you where you can get help.

6. The National Safety Council, 425 North Michigan Avenue, Chicago, Illinois, operates a Construction Section and offers memberships in that section. Costs are based on payroll manhours and this Council has many, many books, booklets, film, posters and program plans available at reasonable costs.
7. Safety, being somewhat akin to religion, has many converts, and you will find many public utilities, city governments, contractors, and others who will gladly share with you their knowledge and experience in the accident prevention field.
8. There are several very good texts in the field of general accident prevention and personnel supervision for safety. A list will be furnished on request.

It is not impossible for you to take a likely young executive or administrative staff member of your organization, supply him with \$25 to \$100 worth of reference books, give him a little time to prow around other operations, visit at length with your insurance carrier, and with other safety engineers, maybe send him to a short course in Accident Prevention, and produce for yourself a fairly successful director of your accident prevention program.

In selecting this man, don't let the continued reference to "safety engineer" get you off balance in your thinking. Actually, there is more human engineering in a safe-
(Continued on page 120)



Measuring Flows and Computing Dosages

MOST of the units that we use for measuring water and sewerage flows are based on gallons and cubic feet; and we combine these with days, hours, minutes and seconds to get a time-volume unit. We also use pounds and grains—not grams—for computing chemical dosages. Grams are units of the metric system which is used extensively in the laboratory but very little in this country for anything else.

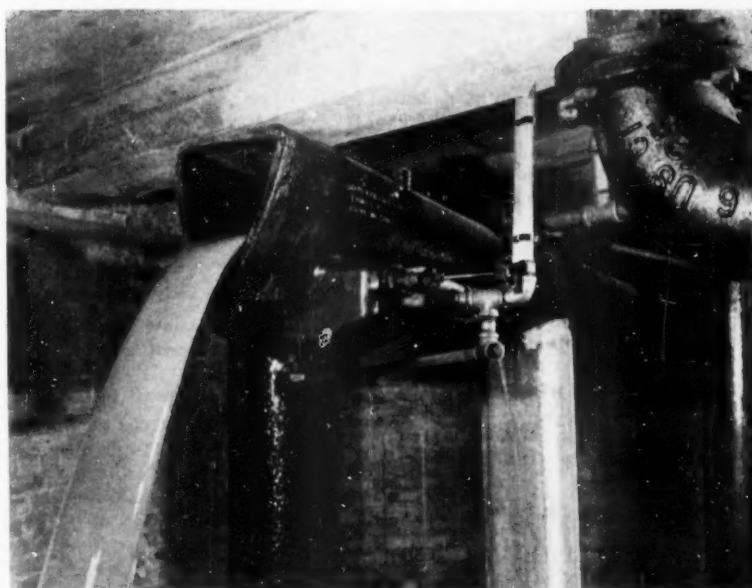
The gallon is perhaps the basic measure. It contains 231 cubic inches and weighs 8.345 pounds. Usually it is accurate enough to assume 8 1/3 pounds for a gallon. The US gallon is smaller than the English or Canadian gallon, which weighs 10.0 pounds and equals 1.20 US gallons.

The cubic foot equals 7.48 gallons and weighs 62.43 pounds.

Gallons per minute, abbreviated gpm, is a common measurement for water, being used especially in pumping, in rating wells, and in similar small measurements. One gallon per minute is 60 gallons an hour or 1440 gallons per day, gpd; 100 gpm equals 144,000 gpd; and 700 gpm amounts to 1,008,000 gpd or very nearly 1 million gallons a day—gpd. A commonly used term in measuring flowing water in streams is a cubic foot per second. Since one cubic foot equals 7.48 gallons, a cubic foot per second, abbreviated cfs, amounts to 60×7.48 or 448.8 gpm. Since there are 1440 minutes in a day, one cubic foot per second amounts to 646,317 gallons per day. A million gallons per day amounts to 1.547 cu. ft. second.

These are relationships that all water works and sewerage men should keep in mind. A set of conversion tables, such as the Dorr Co. has issued, can be of great help in checking and computing.

One cubic foot of water weighs 62.43 pounds, and this results in a pressure of 0.4335 pounds per inch. This is found by dividing the weight—62.43 pounds—by the 144 sq. inches in a sq. ft. Therefore the pressure caused by a column of water 100 ft. high will be 43.35 pounds per sq. in. Similarly it requires a column of water 2.307 ft. high to create a pressure of 1 pound per sq. in.; and a column 115 ft. high for a pressure of 50 lbs./sq. in.



Courtesy Simplex Valve & Meter Co.

● PARABOLIC flume measures flow in partly filled pipes or open channels.

This pressure of water and its relation to the pressure of the atmosphere determines the depth from which a pump can draw water—that is the suction lift. The pressure of the atmosphere is about 14.70 lbs./sq. in. at sea level—less at higher altitudes. Dividing 14.70 by 0.4334 gives 33.90 ft., which is the theoretical suction lift of pumps. Actually the suction lift is much less in practice, the limit being about 26 ft.

There are other terms used to indicate volume of water. One used in our western states especially to measure reservoir capacity, is acre-feet, which means 1 foot depth of water on an acre. Since there are 43,560 sq. ft. in an acre, an acre-foot is $43,560 \times 7.48$ or 325,830 gallons. In marine and shipping activities, water is often measured by the ton—the water tank capacity of a ship is so many tons. One ton of water equals 240 gallons. A common bulk measurement of water in countries where the metric system is used is the liter or the stere. A liter is 0.2642 US gallon; that is a gallon equals 3.785 liters; and the liter is slightly more than a quart—1.057 quarts. The stere is a cubic meter of water and equals 35.31 cu. ft. or 264.2 gallons, and weighs 2201 lbs.

In the west, the miner's inch is used to measure water, usually in irrigation projects. There are various values for the miner's inch, which differs among the western states. An average value is 1.5 cu. ft./min., or about 16,200 gallons per day. This is the amount of water that will flow through a 1-inch sq. orifice under a certain head, usually about 6 ins.

In laboratory work, the liter and milliliter are used practically exclusively, the milliliter or ml being a thousandth of a liter. Formerly, the term cubic centimeter (cc) was used, but now ml is generally used. The two are, in practice, identical. A liter weighs one kilogram—about 2.20 pounds—or 1000 grams. A milliliter therefore weighs 1 gram. A milligram, or mg is a thousandth of a gram; and it is convenient to remember that 1 mg per liter equals 1 part per million—abbreviated ppm. The gram is the standard unit of weight in the metric system. There are 453.6 grams in a pound.

The common avoirdupois pound is 16 ounces or 7000 grains. Because the use of grains per gallon is common in chemical dosages, it is important that these relationships be remembered.

Computing Chemical Dosages

The three most used methods of computing chemicals dosages are: (1) in parts per million; (2) in grains per gallon; and (3) in pounds per million gallons.

Parts per million is always given in weight and so far as this text is concerned, represents the number of pounds of dry solids contained in one million pounds of water, including the solids. The same is true of the other methods listed above.

Parts per Million.—Since most chemicals are measured in pounds, it is necessary, when computing dosages, to begin with the weight of the liquid. Whether this is water or sewage is immaterial, since their weights are practically the same—8.345 pounds per gallon. Therefore one million gallons weigh 8,345,000 or 8.345 million pounds. If the dosage is to be 10 ppm, 83.45 pounds will be required per million gallons.

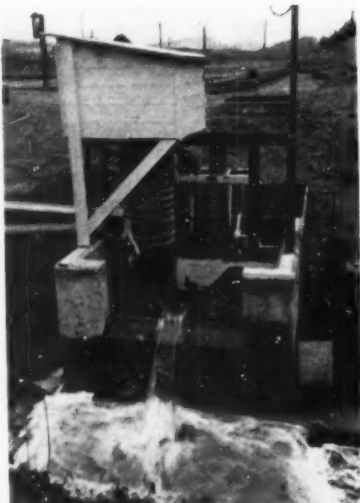
As an example, suppose it is desired to treat a uniform flow of 480,000 gallons per day at the rate of 18 parts per million. The amount of chemical required will be $18 \times 8.345 = 150$ pounds per million gallons; and since there is 0.48 million gallons, the chemical required will be $0.48 \times 150 = 72$ pounds.

It is usually necessary to carry the computations further in order to determine hourly, or even more frequent, rates of dosing. Since a uniform rate of 480,000 gpd equals 20,000 gph or 0.02 mgd, the amount of chemical required per hour is 150×0.02 or 3 pounds. Where the flow is not uniform, as in most water and sewage plants, the hourly variation may be considerable. In order to assure uniform feeding of chemicals, the variations in flow must be known, and the chemical feeder regulated manually according to the flow; or the chemical feeding equipment must be controlled automatically to apply the chemical in accordance with the rate of flow.

Pounds Per Million Gallons.—In this method of computing dosages, no consideration need be given to the weight of the liquid; only the volume needs to be known. The process of computation is a simple one, involving only the multiplication of the dosage by the rate of flow.

Grains Per Gallon.—In water treatment, especially in coagulation with aluminum sulfate, commonly but incorrectly called alum, a dosage rate of grains per gallon is often used.

The common avoirdupois pound



● CONTINUOUS water level recorder with proportional sampler.

contains 16 ounces of 437.5 grains each, or a total of 7,000 grains. An avoirdupois grain is much smaller than the gram used in the metric system, one gram equalling 15.43 grains. Using a dosage of 1 grain per gallon, 7000 gallons will be treated with one pound. Thus it requires $1,000,000 \div 7,000 = 142.9$ pounds of chemical to treat 1 million gallons of liquid. It is convenient to remember that one grain per gallon—1 gpg—is about 143 pounds per million gallons; 2 gpg is about 286 pounds, etc. It is also necessary to remember that these figures do not apply to Imperial gallons, used in Canada, Great Britain and the British Dominions. Since the Imperial gallon is 1.20 times as large as the US gallon, the chemical required will be 1.20 times as much.

Relationships.—Grains per gallon are converted into pounds per million gallons by multiplying by 142.9; grains per gallon are converted into parts per million by multiplying by 17.1; one gpg equals 17.1 ppm. Pounds per million gallons are converted to parts per million by dividing by 8.34; and into grains per gallon by dividing by 142.9. Parts per million are converted into pounds per million gallons by multiplying by 8.34; parts per million are converted into grains per gallon by multiplying by 17.1.

Applying the Chemicals

Chemicals may be fed dry or as a solution. When fed dry, the actual weight of the dry chemical is the basis for computing the feed. When fed as a solution, the solution may be made weak or strong; and this

control of strength of solution, along with control of rate gives much flexibility.

Alum may be fed dry or as a solution; ferric sulphate is usually fed dry; ferric chloride is usually used in solution form; lime is fed dry or as milk of lime; chlorine is best applied as a solution; and this is necessary when hypochlorites are used.

The manufacturer of the feeder is usually the best source of information in regard to capacity and operational details, including calibration or testing; and in respect to the strength of solution best suited for the particular job. The engineers of the State Department of Health can likewise be of assistance.

Alkalinity Requirements

In computing alkalinity requirements for coagulation, it must be remembered that most or many chemicals contain a certain amount of water. For instance, a common formula for aluminum sulfate is $Al_2(SO_4)_3 \cdot 14H_2O$. The H_2O indicates that the compound is a hydrate and the 14 indicates the amount of water it contains. The molecular weight of aluminum sulfate is 342.15, being made up of two Al atoms with a weight of 26.97 each; three S atoms with a weight of 32.07 each; and twelve O atoms with a weight of 16.00 each. The molecular weight of $14H_2O$ is 14×18.02 or 252.28. The total weight, therefore of $Al_2(SO_4)_3 \cdot 14H_2O$ is 594.43 and reaction computations should be made on this basis. Some aluminum sulfates have $18H_2O$ instead of $14H_2O$, and in this case, the molecular weight will be 666.47. Similarly ferric sulphate has the formula $Fe_2(SO_4)_3 \cdot 9H_2O$, and its molecular weight is 562.09.

The use of inaccurate or worn out chemical feeders may result in the application of either too much or too little chemical. Too much chemical results in an operating cost higher than is justified. Too little chemical may produce inferior treatment. Feeders should be checked from time to time and replaced if no longer efficient.

This is the third and last of a series of articles on water and sewage chemistry and chemicals and the methods of using them. The other articles appeared in the October and November, 1953, issues of PUBLIC WORKS.

RUBBER- ASPHALT PAVING

in

NEW JERSEY

Rubber has been used in combination with asphalt for the binder in the production of bituminous concrete for the resurfacing of old concrete pavement on U. S. 30 from Ellwood to Egg Harbor City. The resurfacing was done on the right hand lane, 30 feet wide, leading toward Atlantic City. The section is about four and a half miles long and required approximately 6600 tons of bituminous concrete for the top course one and one half inches thick.

A leveling course of one and one half inches was first laid over the concrete. This was straight asphaltic concrete without the use of rubber. The rubber-asphalt wearing course was placed over the leveling course.

For preparing the binder, ten per cent of RHC rubber was mixed with paving asphalt at the Naugatuck Chemical Plant at Naugatuck, Conn. The rubber and asphalt were agitated in the truck at a temperature of 325° to 350° F. It was then hauled in 3,000 gallon lots to the contractors plant at Pleasantville, N. J. where it was blended with additional asphalt so as to produce a binder containing five per cent of rubber. Sufficient binder was prepared each day to take care of the next day's run. No difficulty was experienced in handling the rubber-asphalt combination at temperatures of about 300° F with ordinary asphalt pumping equipment.

Hauling, spreading and rolling was accomplished by the same means as when regular asphalt binder was used. The contractors on the job were Ole Hanson & Sons, Inc. working for the New Jersey State Highway Department. Bituminous concrete was produced to meet New Jersey Specification MABC-2.

This route carries heavy traffic and should serve as a good project to test the merit of the material.

Photos courtesy United States Rubber Co.



● PAVING MACHINE laying 1½-inch thick layer of rubber-asphalt concrete.



● CHECKING depth of rubber-asphalt wearing course on U.S. 30 in New Jersey.



● LOADING hot mix made with rubber-asphalt binder at contractor's paving plant.



Foresighted Selection of Dual Fuel Engine Cuts Kennett Costs



MAX E. VELTZEN

Superintendent of Public Works
Kennett, Missouri

FORESIGHT in selecting a dual-fuel engine in anticipation of the advent of natural gas is paying handsome dividends in the Kennett, Missouri, municipal power plant. The plant's largest engine, a 2800-hp Fairbanks-Morse diesel, was put into service in the Summer of 1950 and, with no gas then available, functioned as an oil-burning diesel for two years. When natural gas came in 1952, the engine was switched immediately to dual fuel operation. In the first three months, the fuel costs were cut 37 per cent and overall plant costs reduced 27 percent.

Designed by Burns & McDonnell Engineering Company and constructed in 1940, the plant originally had a total of 2425 hp supplied by three Fairbanks-Morse diesels. The installed horsepower was raised to 3025 in 1942.

The immediate postwar period found loads even heavier than in the war years and this condition dictated the installation of another unit, an F-M, 16 X 20-in. engine rated at 2000 hp at 300 rpm and driving a 1400 kw generator. Although this increased the plant's capacity to some 3450 kw, the familiar story of increasing loads led to the installation, in 1950, of the 2800-hp dual-fuel engine, the plant's largest prime mover. This is a 2-cycle, 8-cylinder unit with a bore

of 18 in. and a stroke of 27 in., developing its rated horsepower at 277 rpm.

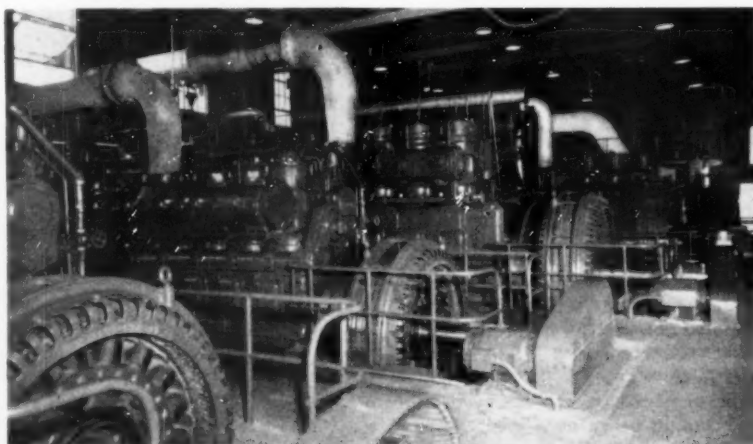
Fuel gas became available late in August, 1952. Carrying 1000 Btu per cubic foot, the gas is transmitted at 50 lb. pressure and regulated in the plant to 28-35 lb. The price is \$0.37 per thousand cubic feet, with a 3 percent increase in the winter months, a relatively high figure but still a cheaper source of heat energy than is fuel oil.

The success of dual fuel operation was immediately apparent. In August, 1952, the last month on fuel oil, the engine produced 330,000 kwh for a total operating cost, including wages and salaries, of \$3590.91 or a per kilowatt cost of 10.2 mills. Although costs in this

range indicate efficient operation, the conversion to dual-fuel reduced this figure by no less than 27 percent. Specifically, in November, 1952, the engine, now carrying a greater portion of the total load, produced 1,322,600 kwh and did this for a total cost of \$7154.73. This figures out to 7½ mills per kilowatt, including all operating expenses, and reduced overall plant generation costs from 11 mills in August to 8.4 mills in November.

The biggest single saving associated with Kennett's dual-fuel operation is in fuel costs. Percentage-wise, this saving amounts to 37 percent, all the more impressive because the gas engine was the plant's most efficient power producer when operating on oil. In August, 1952, running on straight fuel oil, the engine's fuel costs were 7.6 mills per kwh. on the total output of 330,000 kwh. In November, this figure dropped to 4.7 mills per kwh. for an output of 950,000 kwh, in spite of the fact that the fuel gas was bought at the 3 percent higher wintertime price. Actual fuel consumption for the 2800-hp. engine was 5685 gallons of oil and 10,246,700 cu. ft. of gas.

Simple, straightforward design of the plant plays its part in efficient operation. There is sufficient space between the engines so that maintenance work may be carried out with a minimum of interference with normal operating. Many of the auxiliaries are located below operating floor level under quickly removable sectional gratings. Fuel oil storage tanks, the cooling tower, and the snubbers and inlet air filters are all located on the northwest side of the plant so that the best possible appearance is presented to the streets on the south and east sides of the installation.



● INTERIOR of Kennett's municipal power plant, showing engines and generators.

STEEL REINFORCES ASPHALTIC CONCRETE

EXPERIMENTAL application of welded wire fabric in asphaltic concrete pavement—the first in the East—was made recently in Washington, D. C. Purpose of the project, headed up by Harold F. Clemmer, D. C. Highway Department Materials Engineer, was to determine the effectiveness of the fabric (1) in preventing pavement rippling and piling up and (2) in controlling crack formation.

Approximately 3,000 square yards of 16th Street, N. W., near Alaska Avenue, were paved with the wire mesh-bituminous combination. The test paving was done in sections alternating with unreinforced sections of plain asphaltic concrete for purposes of comparison and observation.

Prior to the actual paving, D. C. highway engineers made photographic studies of crack formations in the existing concrete pavement as an aid to later study of the new surface, reinforced or not.

Fabric used was made of 10-gauge cold-drawn steel wire, in flat sheets, 11½ by 7 feet. Longitudinal wires were spaced at 6 inches and transverse wires at 3 inches to help prevent the rippling sometimes caused by heavy traffic loads. The fabric sheets were laid directly on the existing pavement, overlapped transversely 6 inches, and tied with wire in several places across the pavement width to prevent curling and slipping as the truck and paver passed along. The 11½-foot width of mesh provided a three-inch clearance from both edges of the 12-foot binder course of asphaltic concrete.

To prevent the fabric from "hanging up" in the paver, the transverse wires of the mesh were faced down so that the spreader, in effect, slid along the longitudinal wires. Passage was further eased by lapping the fabric sheets away from the paver as shingles are lapped from the ridgepole of a roof.

A Barber-Greene 10-foot paver with one-foot extensions on both sides was used for the resurfacing. To keep the welded wire fabric ironed out flat on the pavement and in proper placement, six sleds were attached to the spreader. These sleds were simply 12-in. steel curbing forms suspended open side up from a steel bar along the front of the paver. Four of the sleds were between the caterpillar tracks with a single sled on either side.

The sleds extended under the paver from the front end to just short of the conveyor screw. Clearing the fabric at the front, they rode along the longitudinal wires and pressed the fabric close to the pavement as the asphaltic concrete was applied. The contractor for the job was Donaldson Paving Company of Washington.

The District of Columbia test is one of a series that is being conducted about the country. First applications were made in 1946 in Liberty County, Texas, and subsequent inspections revealed the reinforced asphaltic concrete pavements there still to be in excellent condition, while unreinforced sections of the same highway (U. S. 90) have had to be resurfaced.

Other trial applications of welded

wire fabric have been made in Minnesota, Illinois, and Indiana, with further tests still scheduled in the latter two states this year. In Indianapolis, ten bus stops were resurfaced with reinforced asphaltic concrete. City officials in communities where buses are replacing streetcars will be watching the results of these applications closely, because unreinforced bus stop pavement is susceptible to rippling and to piling up into rough-riding ridges.

The D. C. test and other trials also will be scrutinized closely to ascertain the ability of welded wire fabric to control and minimize the formation of cracks in asphalt which otherwise might open up as a result of cracks in the concrete base below. It is felt deterioration of the reinforced asphalt will be materially checked because crack control will deny entry of water with its destructive freezing and thawing action.

In this project the steel was laid directly on the base rather than between two layers of asphaltic concrete. One reason for this was that the main purpose of the reinforcement was to prevent cracks from coming up through the asphaltic concrete and this location should be satisfactory for this purpose. Another reason is that the heat of the asphaltic concrete causes the wire to expand and tends to force the steel up into the asphaltic concrete. This might have caused difficulty in the comparatively thin wearing course, whereas it did no harm to the binder courses.

Photos courtesy Wire Reinforcement Institute



● **LAYING AND TYING** welded wire fabric directly on existing concrete. Sheets 11½ by 7 ft. are lapped six inches.



● **SPREADING** asphaltic concrete over welded wire fabric by Barber-Greene paver provided with sleds to hold fabric sheets.

Heavy Macadam Salvages Old Pavement



● ROLLING thick macadam base.



● MAKING bituminous concrete.

THE section of the pavement on old N. J. Route 29, now U. S. 22, east of the Somerville traffic circle has been an expensive and unsatisfactory road to maintain for several years. A combination of poor soil, inadequate drainage and dense, heavy traffic caused the existing concrete pavement to pump and disintegrate.

In 1947 the section was a three-lane pavement. Efforts were made to improve the drainage and strengthen the support. Two courses of bituminous concrete were placed over the old pavement by state forces. Riding qualities were much improved but the concrete slabs continued to move under heavy traffic and water and mud were forced up through the surfacing.

In the meantime plans were made to improve the route by building a separate west-bound new road and reconstruct the old pavement for use as the new east-bound pavement. During the summer of 1953 all traffic was routed over the new west-bound section and the old east-bound section was entirely rebuilt.

It was the original intention to break practically all of the old concrete pavement into pieces about one foot square and this was specified in the contract. The experience of other states in breaking the old concrete and covering it with a fairly thick layer of macadam, plus a bituminous concrete surfacing was one of the principal factors in determining the character of the reconstruction work.

A portion of the concrete was broken in this manner when the work started in April 1953. Unfortunately the rainfall during the month of March immediately preceding the commencement of the breaking operations was 84 per-

cent above normal (7.02 inches actual as compared with 3.82 inches normal) and April was 68 percent above normal. To make matters still worse, all of the rain that fell on the broken pavement ran through it into the subgrade which was already saturated.

The highway department was confronted with a subgrade that, due to the absorption of excessive moisture may have suffered a serious loss of stability, if only temporarily. In view of this development, and being faced with the necessity of completing the project in the shortest possible time, it was decided to allow the remaining 11,000 feet of pavement to remain unbroken rather than gamble on an indefinite continuation of wet weather and a possible resulting instability of the subgrade.

The bituminous concrete top laid in 1947 was removed and the layer of macadam base was placed in the same thickness over both the old broken and unbroken concrete. Crushed stone of 2½-inch size was spread so as to have a thickness of eight inches after consolidation. The stone was spread and consolidated in one layer. Consolidation was obtained by the use of rollers and vibration. After preliminary consolidation, screenings were added and swept into the voids. A vibrating machine was then used to accomplish the filling of the voids with screenings. Water was used during these operations to assist in thorough consolidation and filling. Final consolidation was accomplished by the use of a roller. Just prior to the spreading of the bituminous concrete top the finished macadam base was sprayed with about one quarter gallon per square yard of MC-O asphalt as a prime coat.

The bituminous concrete surfacing, following New Jersey State Highway Department Specifications for hot asphaltic concrete, was laid and consolidated in two layers, each 1½ inches thick. The contractor for the work was the Franklin Contracting Company and the bituminous concrete for the wearing surface was produced at the plant of the Barrett Division located alongside the project.



● VIBRATING machine used for initial consolidation and for filling voids.

DESIGN and APPLICATION of OXIDATION PONDS

THE terms lagoon and oxidation pond have been used interchangeably for all types of earthen ponds incorporated into waste treatment plants. As a matter of clarification, the present trend is to classify as sewage oxidation ponds those ponds of regular and controlled shape, depth, and marginal area, specifically designed and constructed as a waste treatment device. All other ponds such as those formed by damming ravines and dry creeks, whose shape, depth, and marginal area are not controlled are classified as lagoons. Although experience has proven both types of ponds to be capable of producing satisfactory results, present trends are toward the construction of oxidation ponds because they are more amenable to maintenance and are less likely to result in odor nuisances, weed growth, and insect breeding in shallow water areas.

Holding ponds, as differentiated from either lagoons or oxidation ponds, are used principally in conjunction with land irrigation. These ponds are not intended to provide treatment for the wastes, but function merely as storage during peak flows and during the times when it is not practical to irrigate.

Present Applications

When used to provide secondary treatment or oxidation for the effluent from a conventional primary treatment device, such as an Imhoff tank or primary clarifier with a separate digester, oxidation ponds are designed for an organic loading of 50 pounds of BOD per acre of surface area per day, assuming that 35% of the BOD of the raw sewage will be removed in the primary treatment unit. For average sewage strengths, as observed in various Texas cities, the above cited loading figures will result in approximately one acre of pond surface area for each 400 persons contributing to the system. These ponds are usually designed for a controlled depth of 3 feet.

To relieve overloaded plants and/or provide additional treatment, the ponds are usually designed for the same 50-pound BOD loading per acre based on the observed BOD in the plant effluent with allowance

The material in this article consists of essential portions of a paper by D. F. Smallhorst, Sr. Engineer, Texas State Dept. of Health, Austin, Texas; B. N. Walton, Jr. Engineer, Texas State Dept. of Health, Austin, Texas; and Jack Meyers, Professor of Zoology, Univ. of Texas, Austin, Texas. The paper was presented by Mr. Smallhorst before the Engineering Section of the American Public Health Association on November 10, 1953. Certain parts of the paper have been omitted, but the list of references is given in its entirety.

for future increases in both strength and flow of sewage. Oxidation ponds may be used to follow conventional and complete treatment plants which operate normally at or below their design loading, but which may receive seasonal shock loading for relatively short periods of time, seriously affecting the quality of the effluent. Ponds of this type have proved useful in systems which receive extremely heavy loads of a short duration from canning plants, abattoirs, and similar establishments.

The use of a roughing or high-rate trickling filter preceding the ponds to provide greater reductions in organic load to the ponds, thereby decreasing the size of the ponds, appears to be especially applicable to larger cities where very large oxidation ponds would be required without preliminary secondary treatment, or in cities which receive abnormally high strength sewage. Usually the required pond area can be reduced by 50 to 70% according to the loading which will be placed on the roughing filter. This type of construction may also be applicable in areas where land values might tend otherwise to discourage the use of oxidation ponds as the sole method of secondary treatment, but where the high degree of stabilization provided by the ponds would make their use desirable.

Industrial utilization of oxidation ponds or lagoons has been varied. For organic industrial wastes, the ponds have been used in the same manner as in the treatment of domestic sewage. If the carbon-nitrogen balance of the waste is favorable, the ponds require little extra attention over that provided for domestic sewage ponds. However,

if the waste is poor in nitrogen, as is the case in citrus and paper mill waste, nitrogen fertilization may be required for proper oxidation. It has been the practice of some vegetable and fruit canning plants, especially in the northern part of the United States, to lagoon all their waste flow and irrigate from ponds, or to take advantage of any organic load reduction which might occur and discharge the content of the ponds during flood flows, usually in the winter or spring following the canning season. Due to the favorable climatic conditions in Texas, similar industries generally irrigate with the effluent or depend upon evaporation and seepage rates to exceed the inflow, thus obviating the necessity for discharging effluent to a surface watercourse.

Small installations at isolated rural schools, oil camps, pipeline pumping and compressor stations, tourist courts, and small industries which would normally utilize septic tanks and tile drainfields, have successfully used oxidation ponds in areas where soil conditions are adverse to the use of a conventional subsurface drainfield. In most cases, septic tanks are still used for primary treatment, and the ponds are designed for a 50-pound BOD per acre surface loading assuming no reduction in the septic tank. The use of oxidation ponds for these small installations has proven so satisfactory that at least one company has instituted their use as standard practice for its various camps and stations in Texas. Oxidation ponds for rural schools are gaining in popularity because of their ability to function satisfactorily under conditions of intermittent loading, a characteristic not generally associated with other types of conventional secondary treatment.

Holding ponds, as differentiated previously from both lagoons and oxidation ponds, are used by a number of cities in connection with irrigation as the final method of waste disposal. These ponds are not designed with the thought of any particular treatment being accomplished, and they are generally rather small in surface area, but considerably deeper than are oxidation ponds. Their principal function

is to serve as a storage reservoir at times when it is impractical to irrigate.

In the past few years there have been at least three small cities which were financially unable to provide little more than a sewage collection system. To avoid the necessity for discharging raw sewage to a surface watercourse, it was proposed to construct a two stage oxidation pond system. Briefly, these plants consist of a small anaerobic pond which receives the raw sewage, and one or more aerobic ponds following in series functioning in their characteristic manner. The anaerobic pond is in reality, an open septic tank and subject to all the short-comings which might naturally be attributed to it. From the standpoint of removing organic matter and producing a stabilized final effluent, this type system works surprisingly well. However, the possibility of odor and insect breeding nuisances in the

anaerobic pond is sufficiently great to discourage general use, except in isolated areas and under circumstances which absolutely preclude the possibility of constructing some type of primary treatment device.

Theory of Operation

Growth of algae in the ponds and their production of oxygen is markedly affected by temperature. Undoubtedly the temperature relations of different species of algae are important in determining the predominant type of algae in any one pond. For instance, it is known that the growth of certain species, the green alga *Chlorella*, is seriously inhibited at temperatures above approximately 30°C. (86°F) while other closely related species have temperature optima up to 40°C. (104°F). Temperatures of 33° to 35°C. (91.4° to 95°F) have been observed in some Texas oxidation ponds at 6" depths.

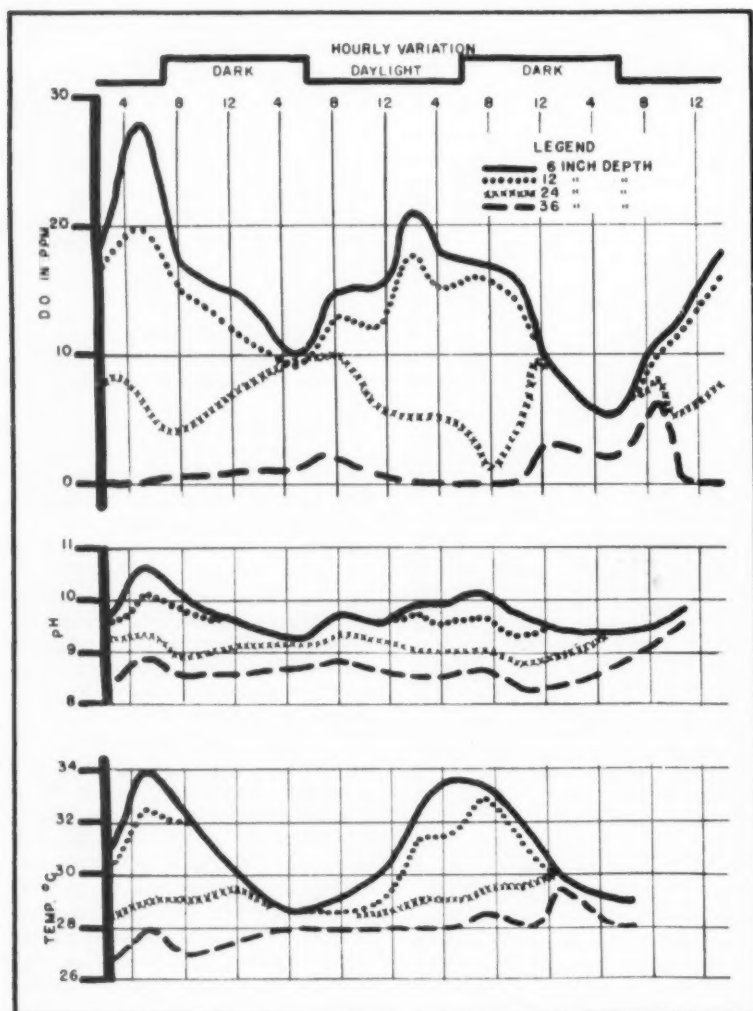
Another interesting occurrence in oxidation ponds is the apparent tendency for dissolved oxygen, pH, and temperature to equalize at night at all depths. When the pond water is warmed during the day to a temperature of 90°F. or above, and night air temperatures drop to some much lower value such as 75°F., thermal currents may be set up during the night which cause mechanical mixing between the surface and lower layers.

Carbon dioxide is taken up by the algae principally as free carbon dioxide, i.e. CO_2 or H_2CO_3 . Little, if any, is taken up as bicarbonate or carbonate. This characteristic accounts for the daily cycle of pH and the general rise in pH throughout a series of oxidation ponds. Carbon dioxide, bicarbonate, carbonate, and hydrogen ions form an equilibrium system. As carbon dioxide is removed by photosynthesis of the algae, more carbon dioxide is formed by adjustment of the equilibrium; but at the same time the pH rises and the concentration of free carbon dioxide decreases. It is a typical pattern of oxidation pond behavior that in the surface layers the pH rises during the day as a result of removal of carbon dioxide by photosynthesis of the algae; at night the pH decreases as a result of carbon dioxide production by the bacterial flora and by the algae themselves. This daily cycle in pH trends may be seen in the accompanying chart.

There are many potential possibilities of developing by-products and the uses of the algae produced by an oxidation pond. Since the algal cell is composed of high protein food, it is obviously well suited for irrigation of grain and forage crops. This fact has been proved many times over by reports from farmers utilizing oxidation pond effluent upon their land. In many instances the yields have been unusually high and the economic gain obvious.

The possibility of harvesting the algae and converting it to cattle feed supplement will undoubtedly receive investigation, as will the adaptability of oxidation ponds to fish-farming with the ultimate conversion of the fish to fertilizer and other valuable by-products. To illustrate the volume of algae cells produced in one typical Texas installation, it has been calculated that the effluent from an oxidation pond

(Continued on page 111)



● VARIATIONS of DO, pH and temperature at varying pond depths.

APWA News

AMERICAN PUBLIC WORKS ASSOCIATION
1313 EAST 60th STREET, CHICAGO 37, ILLINOIS

CHAPTER MEETINGS REPORTED IN TEXAS AND UTAH

Texas Chapter Discusses Disaster Relief

BEAUMONT, TEXAS—The 7th Annual Meeting of the Texas Chapter of the APWA was held in Beaumont, October 25-27. The program included a talk on sanitary and storm sewer problems by George J. Schaumburg, Consulting Engineer of Beaumont and two panel discussions—one on the public works phase of disaster relief and the second on traffic and parking problems. A significant resolution was adopted by the Chapter as a result of the discussion of disaster relief by public works officials

(Continued on page 92)

Sixty Attend Utah Chapter Meeting

SALT LAKE CITY—A total of sixty members and guests attended the annual meeting of the Utah Chapter at Salt Lake City, September 10. The meeting was held in conjunction with the annual convention of the Utah Municipal League.

Roscoe Boden, County Surveyor, Salt Lake County, was elected President for 1953-54 term to succeed Roy W. McLeese, City Engineer, Salt Lake City. Mr. McLeese will continue to serve on the Board in his capacity as Immediate Past-President. Other officers elected were: First Vice-President, J. W. Allen, Manager of Distribution, Mountain Fuel Supply Company, Salt Lake City; Second Vice-President, George W. Poulsen, Jr., Consulting Engineer, Salt Lake City; Members elected to the Board were: Win Templeton, Consulting Engineer, Salt Lake City; E. J. Allison, City Manager, Ogden; and Earl Conder, City Engineer, Provo.

Participating in the technical session were John A. Carollo, Consulting Engineer, Phoenix, Arizona who spoke on "Salt Lake City's Water Filtration Project"; Grant K. Borg, Associate Professor, School of Engineering, University of Utah, presented "Utah's Future in Connection With Sewage Disposal"; and David H. Whittenburg, Chairman, Utah State Road Commission, who spoke on "The Urban and Secondary Road Program."

Bugher Speaks on Cooking Garbage for Hog Feeding

Paper Presented by Robert D. Bugher, Assistant to the Director, APWA, Before the Annual Convention of the Michigan Municipal League

President

Milton Offner

Vice-Presidents

Ralph C. Graham Edward P. Decher
W. A. Coolidge Kenneth King

Past President

Allan H. Rogers

Directors

George G. Hyland Albert G. Wyler
Jean L. Vincenz Frederick Crane

Treasurer

Charles W. Darling

Executive Director

Donald F. Herrick

MACKINAC ISLAND, MICH.—During the past year we have observed what might be termed a major revolution as far as the swine feeding method of garbage disposal is concerned. A year ago only six states had laws requiring the cooking of garbage that was to be fed to swine. Today, just one year later, such laws have been approved in 40 states.

This revolution came as the result of epidemic outbreaks of the swine disease, vesicular exanthema, beginning in June, 1952. This disease, which spread to 41 states in the ensuing months, was attributed almost entirely to feeding raw garbage to swine. Thousands of diseased and exposed hogs were slaughtered and several million dollars in the form of indemnities were paid by the state and federal governments to reimburse the owners for their losses.

(Continued on page 92)

Panel Members Discuss Street Maintenance and Repair



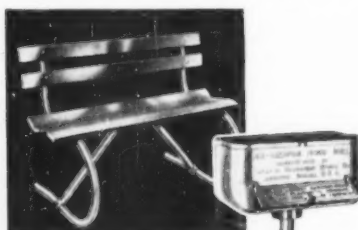
This "What's Your Question" table on the subject of Street Maintenance and Repair was attended by over a hundred men who kept the discussion going for more than two hours, covering a variety of technical and practical problems.

It was very largely devoted to questions and answers after a very brief talk by each member of the panel who were, left to right, Wesley A. Beck, Superin-

tendent of Streets, Tulsa, Oklahoma, "Pavement Cuts and Backfilling"; Roy W. McLeese, City Engineer, Salt Lake City, Utah, (Chairman) "Drainage Structure Maintenance"; Arthur W. Tews, City Engineer, Duluth, Minn., "Seal Coating and Resurfacing"; and George E. Martin, Highway Consultant, Public Works Magazine, New York, N.Y., "Patching Pavements."

You'll like DOING BUSINESS WITH AMERICAN

Since 1911 the finest Park, Playground and Swimming Pool Equipment built, unsurpassed in strength, durability and safety, and backed by *lifetime guarantee* against defective materials and construction... low, nationally advertised prices which today average but little above pre-war 1941... highly personalized service on both your problems and orders... prompt, friendly adjustments to your complete satisfaction... these are just a few of many reasons we believe you'll enjoy doing business with AMERICAN.



American Streamlined
Extra Heavy Duty
Park Bench

All-American Picnic Grill
Portable or Stationary



An American DeLuxe Combination Unit



Official Regulation One-Meter Unit

★ WRITE FOR LITERATURE

AMERICAN

PLAYGROUND DEVICE CO.
ANDERSON, INDIANA U.S.A.

WORLD'S LARGEST MANUFACTURERS OF FINE
PLAYGROUND & SWIMMING POOL EQUIPMENT

Texas Chapter Discusses Disaster Relief

(Continued from page 91)

from Waco, Texas City, San Angelo and Fort Worth. The resolution called for the binding of the membership together to assist any town or city in Texas where disaster may strike and specifically instructed the Chapter President to request a City Engineer or Public Works Director from a city of comparable size to provide relief services to their colleagues in any community struck by disaster.

R. B. Sherrill, Jr., City Engineer of Vernon, was elected President to succeed C. M. Thelin, Director of Public Works, Fort Worth at the annual business meeting. Mr. Sherrill will also serve as ex-officio trustee of the League of Texas Municipalities.

Other officers elected for the 1953-54 term were: J. R. Hennon, Superintendent Water, Sewer & Public Works, Port Neches, Vice-President; H. G. Creel, City Engineer, Denton and H. H. Hester, Street Superintendent, Fort Worth, Trustees; and J. P. Burden, City Engineer, San Angelo, Treasurer. Mr. Thelin will also serve on the Board of Trustees as

FILM OF THE MONTH

Gar Wood Industries, Inc. presented the premiere showing of its new movie "The Modern Way To A Clean Community" at the Public Works Congress and Equipment Show held in New Orleans in October.

This motion picture was designed to help municipal officials educate the public to the benefits that will result from the use of modern refuse collection equipment.

Produced in Kodachrome, the new film can be borrowed for showing to civic organizations by writing to W. S. Blakeslee, Sales Manager, Gar Wood Wayne Division, 36014 Main Street, Wayne, Michigan.

Immediate Past President, E. E. McAdams and C. C. Crutchfield, Executive Director and Field Representative respectively for the League of Texas Municipalities will continue to serve as Secretary and Field Representative for the Chapter.

What the Small Community Should Know About Refuse Collection and Disposal

Results Published on
Joint Study by APWA and USPHS

CHICAGO, ILL.—Practical refuse control practices are presented in a new publication, "Refuse Collection and Disposal for the Small Community", a joint study and report of the U. S. Dept. of Health, Education and Welfare, Public Health Service and the American Public Works Association. Complete with rec-

ommendations for storing, collecting and disposing of garbage and rubbish in accordance with modern sanitation standards, this report also includes suggested ordinances, regulations and representative operational and cost data presented in such a manner that they can be applied to meet varying conditions. Order from American Public Works Association. Price \$2.00; 40% discount to APWA members.

Garbage Cooking

(Continued from page 91)

Remedial measures were demanded almost overnight to protect against future outbreaks of this disease. The wave of legislation mentioned above is the result of these demands. Federal regulations have also been established restricting the interstate movement of hogs fed on raw garbage. Equally important is the regulation withholding the payment of federal indemnities on outbreaks of VE for hogs from premises where raw garbage is fed. In addition, nine states, according to the Department of Agriculture, have adopted active programs calling for the semi-monthly inspection of garbage feeding farms. Drastic action has thus been taken to eliminate the practice of feeding raw garbage to swine.

How will such action affect the cities and villages? This is, of course, the important question as far as municipal officials are concerned.

A number of changes have no doubt taken place during the past five years, but the Michigan Municipal League's In-

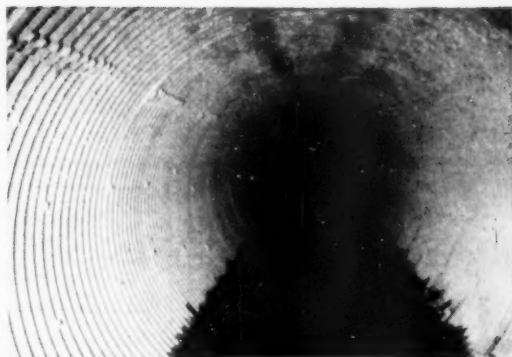
formation Bulletin No. 52, published in 1947, will give us a fairly good indication of the practices being followed in this state. This survey shows that garbage is collected by municipal crews in about four out of every ten municipalities; by independent collectors (most of whom are licensed) in about three out of every ten municipalities and by a contractor who is given exclusive rights to make such collections for the municipality in the other three of each ten cities and villages.

The hog feeding method of disposal is reportedly used by about 50% of the municipalities which make the collections; by about 70% of the independent collectors and by about 95% of the contractors who make the collections. This means that over 65% of the cities and villages in Michigan are directly or indirectly disposing of their garbage at hog feeding farms. Flint, I believe, is the only city in the state and one of the relatively few in the country that actually operates a municipal hog farm.

It can, therefore, be concluded that the majority of cities and villages will definitely be faced with a number of prob-



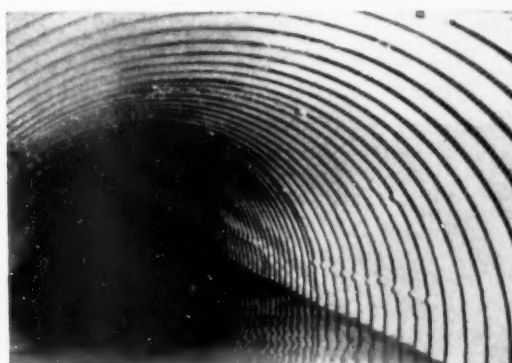
This 36-inch diameter Armco Sewer was recently inspected in a mountain state city.



Large diameter Armco Sewer installed in a midwest city.



This Armco Storm Sewer in a midwest city is of 14-gage, 36 inches in diameter.



A large southern city installed this 30-inch diameter Armco Sewer Structure.

Which sewer has been installed 46 years?

Hard to tell, even from these recent photos, isn't it?

Actually, you can't tell the age of an Armco Sewer just by looking at it. Armco Corrugated Metal Sewer Structures have an outstanding record for long, economical and efficient service.

But in case you are wondering, the Armco Sewer in upper left has been in service 36 years; in upper right, 23 years; in lower left, 46 years; and in lower right, 23 years. How close did you guess?

Long life is not the only advantage of Armco Sewer Structures: Corrugated metal design provides ample

strength for any loading condition. Long lengths speed up installation. Sturdy coupling bands assure tight joints and a continuous conduit. Choice of protective coatings and pavements helps meet severe corrosion and erosion. Size and capacity problems are easily solved within the wide range of sizes and types of Armco Sewers. And unskilled labor can handle the job, saving money at every step.

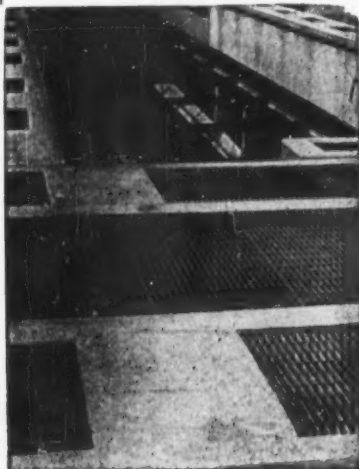
Write us now for complete data on your specific needs. Armco Drainage & Metal Products, Inc., 1603 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation. Export: The Armco International Corporation.

ARMCO SEWER STRUCTURES



Need more facts about advertised products? Mail your Readers' Service card now.

WALK... DRY! SAFE! CLEAN! ON IRVING "DRYWAY" GRATING WALKWAYS and STAIR TREADS



IRVING GRATING

Provides the perfect Dry, Clean, Safe flooring for Sewerage disposal Plants. Gratings of Aluminum, Steel and other alloys offer a minimum of Maintenance Cost.

Catalog Mailed on Request

**IRVING SUBWAY
GRATING CO., INC.**
ESTABLISHED 1902

OFFICE and PLANTS at
5053 27th St., Long Island City 1, N. Y.
1653 10th St., Oakland 20, California

Washington



news

Presented in cooperation with the American Public Works Association
and through the courtesy of the
Washington Office of the American Municipal Association.

DURING the second quarter of 1953, municipalities awarded contracts for 204 projects to abate water pollution and conserve water resources, according to a statement issued by the Public Health Service, of the Department of Health, Education, and Welfare. The \$64.6 million represented by these public sewage treatment plant projects was more than double the amount for the preceding quarter's contracts, and 55 percent greater than that reported in the corresponding 1952 period. Of the 204 projects, 118 are new plants, costing \$45.3 million, and 86 are additions, enlargements, or replacements, costing \$19.3 million.

1954 Public Works Expenditures To Remain High

With year-end totals for 1953 public works expenditures in sight, informed Washington forecasters predict that 1954 expenditures for public works will remain high—at or near record levels. A 5% to 15% downturn is expected in the following fields, however: Hospital construction (both Hill-Burton and VA work); military and Atomic Energy Commission construction; conservation expenditures; and airport construction. Substantial increases are expected in the following public works fields: Highways and turnpikes (about \$1 billion worth of new turnpike work is slated for 1954); schools; sewer and water plant extensions and additions.

Fluorescent Street Lights

In a Washington speech, General Electric's Vice-President, C. K. Fulton predicted that within 10 years every major city in the nation will have an installation of fluorescent street lights . . . present fluorescent street lighting consists of about 1,000 units in use or on order for 18 cities.

September Public Construction

Total public outlays for new construction in September were at about the same level as in September, 1952, \$1.1 billion. Highway construction declined slightly less than seasonally from the record August figure, and public school building continued the upward trend that began in March; according to the U.S. Department of Labor, Bureau of Labor Statistics.

Total public expenditures for new construction thus far in 1953 (\$8.3 billion) were about 5% above the January-September 1952 total. However, the margin of gain over 1952 has narrowed from about 10% in the first quarter to 3% and 2% in the second and third quarters, respectively. The gains this year largely reflect more spending for highways and public industrial plants. Increased outlays for schools and for sewer and water facilities also contributed to the over-all 1953 rise in public activity. Expenditures for military and naval facilities were about the same in both years, for the 9-month period.

Decision Soon on Scrap Export

Department of Commerce officials indicated that a decision will shortly be reached on the problem of continuing the present ban on exports of scrap metal. The ban is believed by many public works officials to be responsible for the present low price of scrap metal cities are receiving. With warehouses full and steel mill storage bins overflowing, the ban on scrap export has tended to keep the domestic supply of scrap far ahead of the domestic demand. Pressures are being put on Commerce Department officials from the scrap industry to have the ban lifted. They pointed out, in a Washington meeting last week, that there is no prohibition on the exportation of finished steel.

LOW COST STORAGE
IN THE
MILLION GALLON
RANGE

PITTSBURGH-DES MOINES

DOUBLE-ELLIPSOIDAL

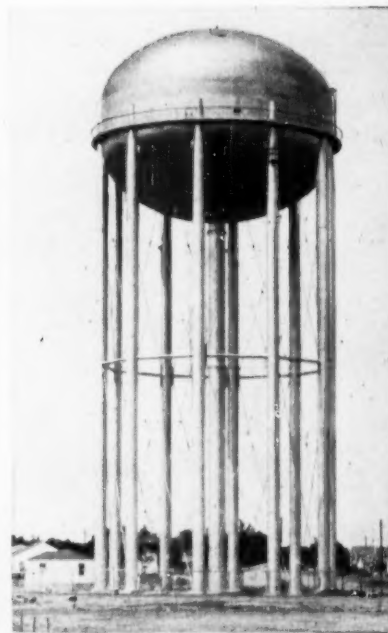
Elevated Steel Tanks



ST. LOUIS PARK, MINNESOTA
Diameter 65 ft.
Head range 48 ft. 5 ins.
H-column tower, 106 ft.



SANDUSKY, OHIO
Diameter 68 ft.
Head range 42 ft.
H-column tower, 81 ft.



AMARILLO, TEXAS
Diameter 68 ft.
Head range 42 ft.
Tubular column tower, 114 ft.



Write for this well-illustrated, comprehensive Catalog of the complete range of P-DM Elevated Steel Tanks, without obligation.

The intrinsic design economy of our famous Double Ellipsoidal Elevated Steel Tank makes this type particularly attractive where low cost with good appearance is a major consideration. Clean cut lines without ornamentation enable savings in construction that are reflected in the purchase price. Fine, simple proportions result in a handsome structure for the community. Let us give you the details on our Double Ellipsoidal and other elevated tank types in a personal meeting, at your convenience.



PITTSBURGH-DES MOINES STEEL CO.

Plants at PITTSBURGH, DES MOINES and SANTA CLARA

Sales Offices at:

PITTSBURGH (25) 3442 Neville Island	DES MOINES (8), 943 Tuttle Street
NEWARK (2) 236 Industrial Office Bldg.	DALLAS (1), 1247 Praetorian Bldg.
CHICAGO (3), 1246 First National Bank Bldg.	SEATTLE 550 Lane Street
LOS ANGELES (48) 6399 Wilshire Blvd.	SANTA CLARA, CAL., 649 Alviso Road

lems if the hog farmers decide that the cooking of garbage for hogs is not an economically sound practice. Information received from various officials of the Canadian Government indicate that they have required the cooking of all garbage fed to swine since 1916. They reportedly have no municipal garbage cooking plants in operation, but do have 631 licensed feeders. J. D. A. MacDonald, City Engineer of Edmonton, reports . . . "Certainly the local hog feeders feel the cost of cooking garbage is worth while because we have little trouble arranging contracts for them to collect this type of waste, under which they not only carry out the collection of the waste, but pay the city a small amount

annually for the privilege." The APWA Special Report No. 15, prepared jointly with the American Municipal Association and published last May contains other testimonials on the desirability and benefits of cooked garbage as swine feed. Even more significant, however, is the results of a recent survey conducted by the Bureau of Animal Industry of the Department of Agriculture. This survey reveals that there are already 143 garbage cooking installations now in operation. In addition, Indiana reported that about 25% of the 256 known garbage feeders were planning to begin cooking operations. Florida, Nebraska, Louisiana, Maryland, Illinois, and Virginia, reportedly had ten or more installations in

operation. None, however, was reported in Michigan; but some will undoubtedly begin the practice as soon as the new law becomes effective.

Experience in Britain

Great Britain has probably had more experience with large scale garbage cooking operations than any other country. This is due primarily to the adoption of a National Food Waste Scheme in that country. R. K. MacDowell of the Ministry of Agriculture, said, "The period 1941 to 1951 saw the commissioning of many central processing plants for waste food in or near about one hundred towns. At these, perishable waste materials were sterilized and treated to reduce bulk and make possible their economic transport to the rural areas in a wholesome condition: 75 percent of these are concentrator plants where the materials are semi-dried; the remaining 25 percent are smaller installations where the raw materials are sterilized without drying. Although about 20 percent of the total are operated by private firms the major installations are operated by local authorities."

The first requirement, he points out, is to comply with the law to boil the wastes for a period of at least one hour at a temperature of not less than 212° F. He also warns that "all that bubbles does not boil" meaning, of course, that the surging caused by the injected steam is apt to be misleading.

The estimated heat required to convert one pound of waste to about $\frac{3}{4}$ of a pound of stable semi-dried stock feed is 442 Btu, 36% of the heat required is for raising the temperature to the boiling point, 55% is for drying the product by means of evaporation and 9% is wasted. The value of the feed is, of course, measured in terms of the dry material in the product; the careful regulation of water is therefore of prime economic importance to both the processor and the purchaser. The farmer has to bear the cost of evaporation while the latter generally pays for the cost of the residual moisture.

The first assessment of the feeding value of concentrated swill was carried out at Cambridge, England, according to Mr. MacDowall. He says, "The material was found to contain an average of 32% dry matter. An ordinary pig meal will contain 87 to 88 percent dry matter, one ton of this concentrate contains about as much dry matter as 700 lbs. of meal." He also points out that the feeding value of the concentrate was found to be almost the same as a pig meal consisting of two parts barley and one part middlings.

Some of the heat-treating methods now being utilized in this country are of an experimental nature. They represent the simplest emergency measures that could be employed when cooking garbage became compulsory. Probably, the foremost example of this was the placing in some manner of steam-pipes into truck bodies in which the garbage was collected, and cooking the material directly in the truck.

All Working Parts Contained in Removable Barrel—New Barrel Installed in Jiffy



MATHEWS

HYDRANTS

Made by R. D. Wood Company

Public Ledger Building, Independence Square
Philadelphia 5, Pa.

Manufacturers of "Sand-Spun" Pipe (centrifugally cast in sand molds) and R. D. Wood Gate Valves

Get full details of this month's products . . . mail your Readers' Service card today.

- The barrel, containing all the working parts of the hydrant, is readily removed for inspection or for repair by simply unscrewing from the elbow and withdrawing from the protection case. *No excavating.*

- This exclusive Mathews feature eliminates any need for repair work on the job. A spare barrel can be inserted in a few minutes and the broken barrel repaired in the shop.

- With automobile accidents breaking an increasing number of hydrants, this speed of replacement is of tremendous importance in maintaining community fire protection.

No Other Hydrant Offers So Many Essential Features

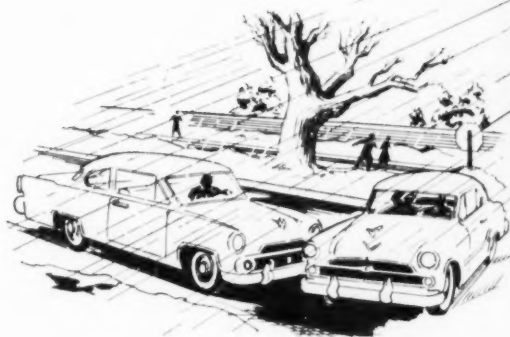
Compression type valve prevents flooding • Head turns 360° • Replaceable head • Nozzle sections easily changed • Nozzle sections easily raised or lowered without excavating • Protection case of "Sand-Spun" cast iron for strength, toughness, elasticity • Operating thread only part to be lubricated • All working parts contained in removable barrel • A modern barrel makes an old Mathews good as new • Available with mechanical-joint pipe connections

150th
anniversary

Hi-Way ICE CONTROL Method Shows You the Best Way to--



"PULL THE TRIGGER" ON OL' MAN WINTER!



Heres Real Help for the "General Staff" of any Community, large or small. "Know-How" for Your Winter Campaign against Ice & Snow

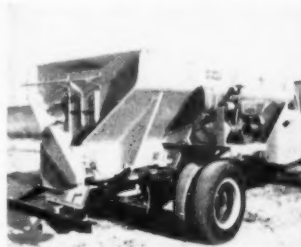
HANDLING CALLS from irate voters after winter storms are real headaches. And straightening-out traffic tangles takes up lots of time. Here's where Hi-Way's Ice Control Method fits into your picture. It's simple . . . it's inexpensive . . . it makes year 'round good sense! With Hi-Way Spreaders, there's no waste materials . . . they all go where they're needed most . . . in uniform quantities. You'll find manpower goes further, too, as one man handles a spread job himself; other methods often took 2 or 3. And there are no costly breakdowns. You'll find that Hi-Way Spreading Equipment does your job faster . . . making more miles of highways and streets safer per hour. They perform at speeds up to 35 MPH., spreading uniformly at any in-between-speeds.

When storm forecasts come in, your trucks can be ready-loaded for action. All you need do is call out the driver. And best of all, Hi-Way equipment is versatile. There's no summer idle period. It can be equally as efficient for seal coating, road stabilization and dust control with sand, stone, chips, rock salt or calcium chloride. Your job will be easier with Hi-Way . . . the results more satisfying . . . the cost less . . . with added safety. Irate voters become happy voters, impressed with your good judgment.

See Your
HI-WAY
DISTRIBUTOR
or Write
Factory
for a
Demonstration



HI-WAY MODEL W—"SPREAD-ALL" designed and engineered for heavy-duty, year 'round spreading. Available in 7½ to 12½ cu. yd. capacities. Spreads any width from 4' to 70'.



HI-WAY MODEL E—all-purpose truck-mounted, self-unloading spreader, power-take-off or separate motor drive. 4½ to 7½ cu. yd. capacity.



HI-WAY MODEL DD—an all-season, low-cost portable tail-gate spreader mounts on standard dump body, quickly, powered by rugged gas engine.

HIGHWAY EQUIPMENT CO. Inc.

645 D Avenue N. W., Cedar Rapids, Iowa

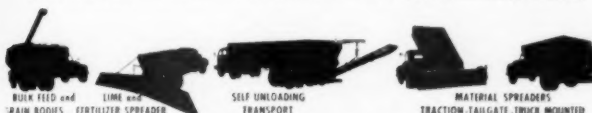
Send me more information and specifications on these Hi-Way Spreaders, ☐ Model W—"Spread-All"; ☐ Model E—All-purpose, truck-mounted; and ☐ Model DD—Portable tail-gate mounted.

NAME _____

ADDRESS _____

CITY _____

STATE _____



MANUFACTURERS OF THE WORLD'S MOST COMPLETE LINE OF
SPREADERS AND BULK MATERIAL DELIVERY EQUIPMENT

Thousands use our Readers' Service card to keep up to date . . . do you?

Garbage is collected on a contract basis in Denver, twice a week in residential areas and once a day in commercial areas. Collections average about 216 tons a day. Denver pays the contractor \$115,000 per year plus \$7,000 per year for collecting dead animals. Garbage is collected in open-bed trucks holding from three to five tons of garbage. Each truck is equipped with a canvas tarpaulin for covering the load during transportation through public streets. The garbage is delivered to twenty different hog feeders in the area. They, that is, the hog feeders financed the installation of all the cooking operations. Some installed their own individually, while others teamed up to provide a cooperative cooking installation.

vide a cooperative cooking installation.

This, and other heat-treating methods that are now being used in this country are fully described in the publication entitled "Equipment For the Heat-Treatment of Garbage to be Used for Hog Feed" issued jointly last year by the U. S. Department of Agriculture and the U. S. Public Health Service, (See PUBLIC WORKS for May, 1953).

Because of the widespread interest in the practice of cooking garbage in trucks considerable field testing has been conducted to determine the suitability of this practice. The following conclusion was reached after the New York Regional Office of the Public Health Service had made a series of tests in cooperation with

a swine grower near Secaucus, New Jersey: "Garbage can be disinfected in a metal tank truck body, using steam injected directly into the mass through laterals placed on 14-inch centers and terminated with blow-off valves. Due to the many possibilities of inadequate heat-treatment in this type of system, however, it is believed that this is not the ultimate solution to the problem, either from the viewpoint of the operator or of the regulatory agency, and this system of heat-treating garbage should be used only as an interim measure until a properly designed built-in-place installation is available."

Leo Weaver, Senior Sanitary Engineer for the Division of Sanitation of the U. S. Public Health Service, in a paper presented at the 1953 Interstate Sanitation Seminar held in Athens, West Virginia, said "... although other methods are being tried at the present time, most success for disinfecting purposes is being obtained by utilizing direct introduction of wet steam into garbage. As time goes on, there probably will be a greater trend toward permanent installations."

The most influential factor, perhaps, in determining whether hog feeding will continue as a major method of garbage disposal is the cost involved in cooking the garbage. The costs reported in the U. S. Department of Agriculture survey mentioned earlier, vary considerably. One large farm (6,000 swine) which fed 24 tons of garbage daily had an initial equipment cost of \$10,000 and reported its cost of cooking (labor and fuel) at 44 cents per ton. The costs of cooking garbage at the Denver plants ranged from 65 cents per ton for the large units to \$1.50 per ton for the smaller operations. It is reasonable to assume that many contractors and independent collectors will abandon the practice of feeding garbage to hogs. This will cause many cities and villages to turn to the other methods of disposal. In this connection you will be interested to know that the American Public Works Association and the U. S. Public Health Service have been preparing, over the past year, as a joint project, a publication on methods and procedures for refuse storage, collection and disposal in the small community. This publication has now been issued.

I have said that experience in Great Britain showed that separation of garbage from rubbish was a handicap in the cooking operation. F. J. Mulhern, Bureau of Animal Industry, who is in charge of the Federal Government's VE Eradication Program, offers this observation: "As a result of trips throughout the country, it has been learned that one of the major factors or points of argument used against the cooking of garbage is the difficulty found in properly treating household garbage due to the large content of paper, bottles, etc." The reason that I mentioned this is simply to point out that suggested ordinances and regulations are included in the APWA-PHS publication. These include provisions concerning the separation of garbage from rubbish.

The Wages of Tools—How They Pay For Themselves

WM. M. HENDERSON,

Pres., So. Calif. Chapter, APWA.

WAGES, to be sustained, must be offset by production. Otherwise the cost to manufacture will price the producer out of the market and the worker out of a job. This is just as true in municipal, county and state work as it is in industry.

Tools make workmen productive. Increased production reduces manufactured costs, retains the market and keeps the worker his job.

Here then, is an economic approach to put the worker and the work whether public or private, in balance. We think of workers in terms of the wage paid per minute or per hour. But, when we consider tools, we look at the price tag—the first cost. Since tools supplement men, then the man or the tool, the one without the other, is but the bare bones of a possibility. Put tools in workers' hands and the enterprise is animated; the equation is in balance; and the answer is production. The solution is simple if we think in terms of the common denominator—wages. Wages are paid for tools—the same as we think of wages paid men.

The wage for tools is the sum of the charges paid for the use of the money to purchase the tool, that is, interest on the investment; plus a depreciation charge to amortize the cost within the useful life of the tool. This applies to hand operated tools only. For power tools the cost of power or fuel for operation should be included.

To illustrate: Consider a \$100.00 investment in a hand operated tool. The wage for the use of the \$100.00 @ 6% per annum paid monthly is

50¢; assume about 4 years for retirement of tool or 24% per annum on the cost of tool, that is \$2.00 monthly charge. So then the total fixed charges to possess the tool and retire it at 4-year intervals is \$2.50 a month.

On a work month of 21 eight-hour days (168 hours), the \$100 tool wage is 1½ cents a work hour. That is less than the wage rate paid for but one minute of one worker's time.

All that need be excepted from that tool is to recover as productive work, the equivalent of one man-minute for every hour on the job. Then the tool pays its wage, and any additional production recovered is clear profit. On the same basis, \$1,000 invested in tools, costs but 15¢ an hour; or \$10,000 costs only \$1.50 an hour on the job.

The worker sells time and makes it available for use. If you fail to use the time efficiently, or not at all, you pay. Time paid for but not used is a total loss. But when you purchase tools the cost is not the purchase price, but only the carrying charge. When the tool is idle, this charge is not a total loss, like unused labor time, for you still have the tool and its useful life is extended accordingly.

For the lack of proper tools time is lost. Obsolete and worn tools lower production. Tools should be available in good order and modern; it is better to have extra tools than idle men, for tools contribute to increased production and better quality of work.

It is all very simple: Put the tool on the payroll; you get immediate use from it and the tool earns its keep and helps pay the worker's wage.

You just can't lose.



Lithographed on stone for U. S. Pipe and Foundry Co. by John A. Noble, A. N. A.

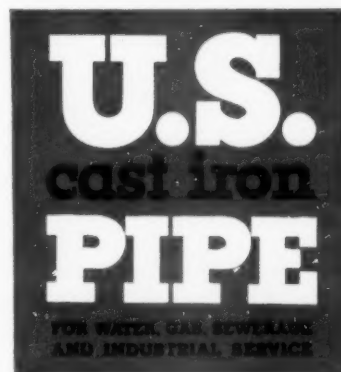
WHEN THE GROUND is unstable or a definite grade has to be maintained cast iron pipe is frequently laid on piers or pile bents. Whether above ground or underground there are installations of cast iron pipe with continuous service records measured in generations.

We are well equipped to furnish your requirements for cast iron pipe and fittings made in accordance with American Standard, Federal and American Water Works Association specifications.

U. S. pipe centrifugally cast in metal molds is available in sizes 2- to 24-inch and pit cast pipe in the larger sizes with bell-and-spigot, mechanical, flanged or other types of joints.

United States Pipe and Foundry Co.,
General Office, 3300 First Ave., N. • Birmingham 2, Ala.
Plants and Sales Offices Throughout the U. S. A.

Now's the time to mail this month's Reader's Service card.



PUBLIC WORKS DIGESTS

THE HIGHWAY AND AIRPORT DIGEST

Maintenance by Contract in Ohio

The Ohio State Highway Dept. maintains 17,182 miles of state highways. It has a maintenance organization of 4800 men with about 600 additional temporary workers in summer. These perform routine maintenance work; but a great deal of repair work is let out by contract. Operations let to contract include bituminous treatments, under-sealing, bridge maintenance and repainting, guard rail reconstruction and painting, roadside weed spraying, and surface, shoulder, and stockpile aggregate. Last year the work let by contract totaled \$6,445,894.82, while that done by state forces cost \$821,774.17. There was plenty of competition for contract work, and 54 of 59 contracts let in June 1953 were below the engineers' estimates. The department feels that by contracting they get low cost, efficiency and quality. When a satisfactory unit estimate can be obtained for a particular type of operation, it is contracted. This year a contract has been let for spraying roadside weeds on all the state roads in Muskingum County.

"Highway Maintenance by Contract Works in Ohio." By C. W. McCaughey, Chf. Engr. of Maint. *The Constructor*, October.

Radar Checks Speeders

New Rochelle, N. Y., has purchased, for just over \$1,000, radar apparatus for detecting speeding on its streets. Its use requires two cars. The radar detector is set up in the rear of one car, with its beam aimed to intercept traffic 200 to 300 feet down the street, and indicates by a pointer the speed of each car that passes through the beam. If this speed exceeds the limit, the operator transmits by radio a description of the offending car and the speed, to an officer in the other car, which is stationed about a quarter of a mile

beyond. This officer stops the speeder when he reaches him a few seconds later and gives him a ticket.

"Radar Checks Motor Vehicle Speed." *PUBLIC WORKS*, November.

Use of Salt for Snow Removal by Toronto

The Dept. of Street Cleaning of Toronto, Canada, uses 8,000 tons of rock salt annually for removing snow from its streets. It is purchased during the summer and placed in storage sheds. At the commencement of a snow storm, crews distribute coarse rock salt at the rate of 400 lb. per mile on all highways, and on main residential streets on hills, grades, and curves; and patrolmen distribute it on crosswalks at all intersections. By the continuous distribution of salt during snow storms, almost complete removal is effected by melting, except that continued heavy falls necessitate plowing. So effective is the use of salt that the department does not plan to purchase any more plowing or removal equipment.

"Toronto's Winter Plan: Keep All Streets Open." By H. D. Bradley, Com'r of Street Cleaning. *Roads and Streets*, October.

Joint Sealing and Mud Jacking in Louisiana

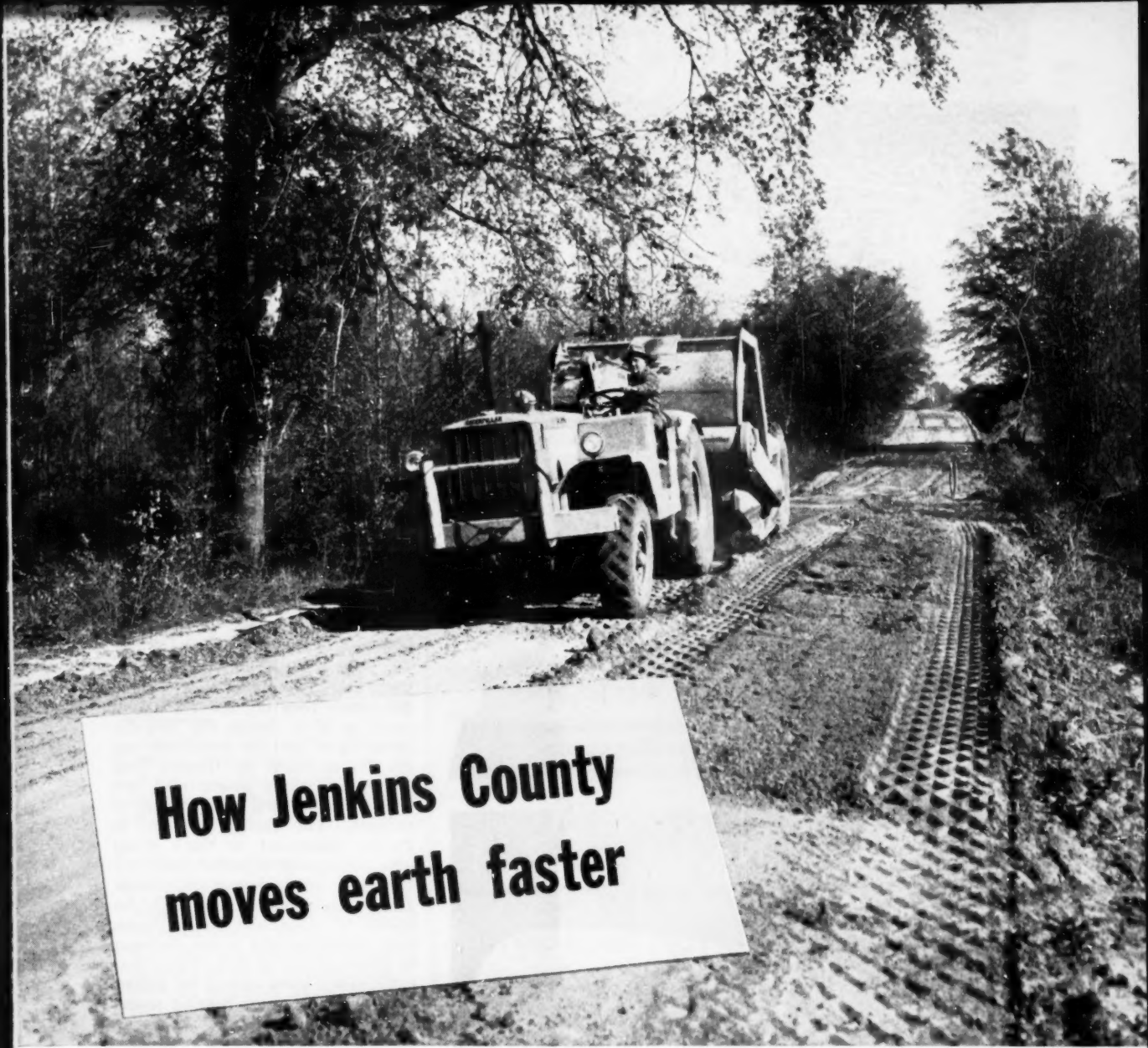
The Louisiana Dept. of Highways, working with the American Bitumuls & Asphalt Co., has recently developed new methods of patching and joint sealing of concrete pavements. Emulsified asphalt is used in a cold mixture for surface patches and as a tack coat for patches. Used for sealing cracks, it penetrates the entire depth. If any is spilled on the surface when pouring into the crack, a light sprinkling of fine sand on the traffic side prevents the formation of a ridge or bump. Mud jacking is employed for raising slabs and for filling voids under the pavement, using emulsified asphalt slurry, the

consistency varying—stiff for raising the slab, thin for filling voids. The proportion used is: 2 cu. ft. of soil, 7 lb. of cement, and 4.5 gal. of EA-4 asphalt emulsion, with enough water to give the desired consistency. Several changes made in the standard mud jack have increased its efficiency.

"Better Joint Sealing and Mud Jacking Methods Developed in Louisiana." By Earle A. Landry, Engr., La. Dept. of Highways. *Roads and Streets*, October.

Automatic Traffic Control at Intersections

At one street intersection in White Plains, N. Y., six major streets meet at a traffic circle, through which 25,000 vehicles pass in a day. Three policemen stationed here were unable to keep the traffic moving smoothly. To alleviate this condition, the streets were widened where they meet the circle, five of them were made one-way streets, and automatic traffic signals replaced the police. Now the vehicular traffic is controlled by a Super Electro-matic Dispatcher, and pedestrian crossing by a Minor Movement Controller. Vehicle detectors, installed 250 ft. from the intersection on each street that feeds traffic into it, notify the Dispatcher each time a car approaches it. The dispatcher balances the amounts of traffic approaching on the several streets and gives the green light to the street with the greatest amount, keeping it green only long enough for the waiting cars to pass; if this exceeds 60 seconds, it halts this traffic long enough to let that from the other street pass. Other ingenious features operate to assure that the greatest possible traffic volumes are always moving through the intersection. To permit safe crossing of the streets by pedestrians, a button pushed by a pedestrian sets up a "Walk" period of 12 seconds during which all vehicular traffic has a red light. The equipment cost \$12,000, but reduces



How Jenkins County moves earth faster

This Cat* DW10 Tractor with No. 10 Scraper is spreading fill dirt on a low section of road in Jenkins County, Georgia. Self-loading on down grades, it makes a complete cycle in 3 minutes, 10 seconds, over a 900-foot haul. And in every load it handles 11 heaped yards of hard-packed sand and hard-to-handle clay.

County Superintendent F. A. Deason says: "I wouldn't do without this machine. I'm a Caterpillar man 100% and always have been. If there's ever a better piece of road machinery built, I'm sure Caterpillar will build it."

The DW10 is a practical, money-saving unit for any county that has a cut and fill problem on its roads. It's simple and easy to operate, and like all Caterpillar products it's built for a long life of hard work. The scraper makes accurate cuts, loads well, with good boiling action in the bowl. Its positive ejection assures clean dumping, even with sticky material. The big tires give ample flotation in soft going. Other advantages owners appreciate are eco-

nomical fuel consumption, trouble-free operation and high resale value.

Your Caterpillar Dealer can show you just how profitable the DW10 and No. 10 Scraper can be in your road work. He'll prove it with a demonstration right on the job. And he'll back his machines with reliable service and genuine factory parts. See him today.

Caterpillar Tractor Co., Peoria, Illinois.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

**NAME THE DATE...
YOUR DEALER
WILL DEMONSTRATE**

FOR *positive* ICE AND SNOW CONTROL



THE "SCOTCHMAN" SPREADER

is **BEST** because:

1. It **SAVES** you **MONEY** — The "Scotchman" — method (clear de-icing salts) is **50% cheaper** than sanding or cinder-ing.
2. It **SAVES** you **TIME** — The "Scotchman" is a **FAST** spreader — up to 8 times faster.
3. It is specially designed for simple, trouble-free operation.

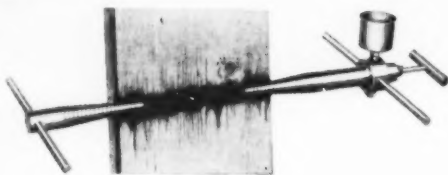
The "Scotchman" is the Most and the **BEST** spreader.



TARRANT

Manufacturing Company
27 Jumel St., Saratoga Springs, N. Y.

Greenlee Bolt Hole Treaters



assure maximum life for poles, piles, timbers

Prevent decay around holes bored in new or old poles and timbers by pressure-treating each hole bored in the field. It's a simple operation with a GREENLEE Bolt Hole Treater. Treats the entire hole... forces preservative into all the wood cells around the bolt hole. Simply pour preservative in Treater cup until hole and cup are full. Pull back on handle, spring return does the work. Two models. Write for details. Greenlee Bros. & Co., 1752 23rd Avenue, Rockford, Illinois.



to one the number of traffic officers required at this point.

"Automatic Signal Will Pay for Itself in Three Years." *PUBLIC WORKS*, November.

Horizontal Drains For Stabilizing Cuts

In controlling slides in cuts on Oregon State Highway No. 58, which cuts varied from 20 to 200 ft. deep, several methods were used. Some small slides were stabilized by removing some of the slide material at the toe and replacing it with free-draining gravel or rock. For larger mass movements, deep drain wells were installed temporarily until a more permanent drainage system could be developed. The permanent system used most was drilling horizontal drains, a method developed by the California Div. of Highways in 1939. Most of the soils contained a very hard basaltic talus rock, and several types of machines were tried for drilling through this, including a Hydrauger and a Sullivan core drill. Various types of bits were used, the most effective being the rotary rock bit, the 3 3/4 in. bit made by H. C. Smith Oil Tool Co. being found best for solid rock and the 4 1/4 in. made by Hughes Tool Co. best for very plastic clay, but either can be used in any kind of material. For casing, 1 1/2 in. to 2 1/2-in. galvanized or black metal pipe containing 6 perforations per foot was used; but it was suggested that a plastic pipe might be easier to place and to perforate, less expensive and more resistant to deterioration. It is believed that exploratory holes should be drilled first, to locate water-bearing seams and thus reduce the number of exploratory drains. The cost of drilling and casing drains averaged \$1.83 per lin. ft., including cost of equipment.

"Cuts Stabilized by Drilling Horizontal Drains on Lookout Point Reservoir Relocation Work." By Jack E. Newby, Materials Engr., U. S. Corps of Engineers. *Civil Engineering*, October.

Special Instruments For WASHO Road Tests

A road test, which may go far in determining what are the maximum loads on which it is economically feasible to base the design and construction of roads, is being conducted in Idaho by the Western Association of State Highway Officials (WASHO) and the Highway Research Bd. The immediate objective is to develop information

concerning the relative effectiveness of several designs of flexible pavement, varying in over-all thickness from 6 to 22 in., under repeated applications of 18,000 and 22,400 lb. single-axle loads and 32,000 and 40,000 lb. tandem-axle loads. These runs will be completed some time in 1954. One conclusion already warranted by visual observation is that thin under-designed pavement, when subjected to a succession of heavy loads, fails first (and fast) along the wheel track next to the shoulder.

A notable feature of this test is the instrumentation provided for measuring variations in moisture content and temperature of the pavement components. Thermistors and moisture cells were placed during construction at various depths down to 72 in. Both are of the electrical resistance type. Routine checks are made of these. Elastic deflections under loads are measured by a Benkelman lever-arm deflection indicator. Vertical movement is measured and recorded electronically by linear variable-differential transformer and oscillograph.

"Special Instruments Measure WASHO Road-Test Data." By W. N. Carey, Jr., Project Engr., Highway Research Board. *Civil Engineering*, October.

Polished Aggregates Cause Slipperiness

Experience has shown that certain limestones when used for both fine and coarse aggregates in concrete pavements result in a surface which, under the action of traffic, becomes highly polished, and is slippery when wet; the stopping distance being about twice as long on these as on silica sand concrete. In Pennsylvania this slipperiness was remedied by covering the concrete with a bituminous surface. This relation between slipperiness and polished aggregate is not so clearly established for bituminous surfaces as for portland cement concrete because many slippery surfaces are due to an excess of asphalt. Nevertheless, there is ample evidence that, in many asphalt surfaces, slipperiness is due to polished aggregate. Pennsylvania is now prohibiting the use of stone sand in portland cement concrete, and of fine limestone aggregate in bituminous concrete; the latter, in effect, requiring the use of slag sand or natural silica sand. It is reported that Virginia will require, for bituminous concrete, that 50% of the fine ag-

NEW McConnaughay MULTI-PUG ASPHALT MIXER

REMOVES
BOTH
MOISTURE
AND
SOLVENTS

MODEL
HTD-500



Prepares Hot or Cold Bituminous Mixtures — 1/4 Ton Capacity

Designed for economy of operation in the production of bituminous paving mixtures, this new McConnaughay HTD-500 Mixer is large enough (1/4 ton capacity) for many resurfacing jobs as well as all types of pavement patching. Working on location, it provides the exact amount of material needed; never too much or too little. It has a low pressure burner directed into the mixing and heating unit through a combustion chamber. This HTD-500 and all McConnaughay HTD models are the only mixers which effectively remove both moisture and solvents from bituminous mixtures... giving you positive assurance that



McConnaughay HTD-500 at work on street patching job in Cheyenne, Wyoming.

patches and resurfaced areas will set up hard as soon as the applied mixture cools. Write, wire or 'phone for details and specifications today.

K. E. MCCONNAUGHAY
LAFAYETTE 2, INDIANA

gregate shall be silica sand, granite, trap, or slag screenings. It is believed to be desirable to require the use of silica sand for portland cement concrete pavements, and either silica sand or slag sand for bituminous concrete wearing surfaces.

"Danger—Slippery When Wet," By C. E. Larson, U. S. Bureau of Public Roads. *Engineering News-Record*, Oct. 29.

Stabilizing a Gravel Road

During the winter of 1949-50 the Connecticut state highway department built at Hartford, a gravel road 30 ft. wide and 3.4 miles long paralleling a limited-access highway to carry local traffic, including materials taken to the municipal dump. Approximately 65,000 cu. yd. of earth was placed and consolidated to form a subgrade, and on this was placed a 12-in. gravel road built in two courses. The gravel sizes ranged from 2 1/4 in. to No. 100, with only 0.5% of the No. 100 and this having no plasticity. In all, 29,100 cu. yd. of gravel was used at a cost of \$2.30 per cu. yd. During 1950 this road became rough and dusty, and the city stabilized the top 6 in. by use of tar binder. A

Seaman Pulvimixer pulled by a tractor loosened the gravel in three or four passes. Then a self-propelled Pulvimixer coated the gravel with 1 1/2 gal. of road tar per sq. yd., completing the mixing with 3 or 4 extra passes. This was consolidated by 8 or 10 passes of a rubber-tired roller. It then looked smooth and was not blade-graded, which proved to be a mistake, for it became slightly rough during the winter, and later was smoothed and sealed with asphalt emulsion RS-1 at the rate of 1/3 gal. per sq. yd., covered with 25 lb. per sq. yd. of half-inch stone. As first constructed, the road, after rolling, had been given a rock coat of approximately 1/4 gal. of road tar RT-4 covered with 20 lb. of sand swept and rolled in place.

"Building and Stabilizing an Access Road." By G. E. Martin, *PUBLIC WORKS*, November.

Soil Cement

(Continued from page 63)

nance record to be remarkably good. In addition, since granular surfacing and base material had to be brought into the county, soil-cement base was estimated to be approxi-

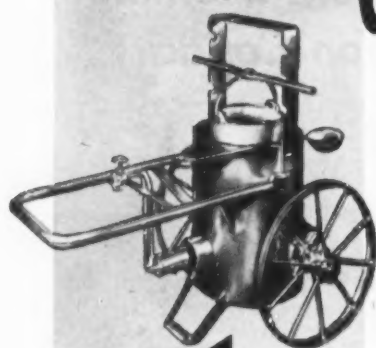
mately five cents per sq. yd. lower in first cost as well. Output was 6000 sq. yd. per 9-hour working day on the average, and up to 9400 sq. yd. was placed in a 10-hour day with county working forces. In 1949 and 1950, 26.6 miles were built, costing from 60 to 65 cents per sq. yd., depending upon distances for hauling bulk cement. In 1951 the county engineer noted that there were no records of repair due to soil-cement base failure, and no evidence of depreciation of the bases, despite severe winter exposures.

At Edwards Air Force Base, near Mojave, California, a city is being created to house base personnel. Included in plans for this city are 40 miles of soil-cement base for streets, built with desert soil above the dry lake bed on which the field is principally located.

The first 19 miles of these streets were subcontracted to a firm which has used train-lane methods to produce about 5,000 sq. yd. of soil-cement base per 8-hour shift. Construction has been standardized so that all streets are being built in multiples of 11-ft. widths (22-33 ft.), in 500-ft. long units.

The procedure has been to compact the subgrade to 95 per cent of

LPG and OIL FIRED



Aeroil
lead
melting
furnaces



Put an Aeroil Furnace to work on your next job and see how Aeroil's faster controlled melting speeds save time and fuel for you. Available in capacities of 200, 400, and 850 lbs., on wheels or stands, oil or LPG fired.

For complete information about Aeroil Furnaces and Compound Pots, write for your free copy of Bulletin 232RA.

Aeroil Products Co. Inc. • 19 Wesley St. • S. Hackensack, N. J.

How to overcome industrial waste problems economically and effectively

Just Out!

INDUSTRIAL WASTE TREATMENT

By Edmund B. Besselièvre

Chief Sanitary Engineer, International Sales, The Dorr Co.

370 pages, 100 illus., 55 tables, \$7.50

This working guide helps you launch and carry through a practical program of solution at a minimum cost and maximum results. In it the component factors and economical aspects of the waste problem are discussed, enabling you to properly evaluate them and arrive at a successful solution. It summarizes the functions and jurisdiction of various agencies as well as the laws controlling discharge of wastes into streams.

Tells how to:

- determine the degree of treatment required
- determine the volume of waste
- separate materials from liquids by gravitational sedimentation
- treat dairy wastes
- treat wastes from fermentation industries
- treat chemical plant wastes

The methods, treatment plants, and units of equipment available for waste treatment are described, with numerous flow diagrams and photos showing their successful use. To minimize stream pollution and reduce costs of treatment, the book points up considerations of plant design and construction and techniques of reclaiming byproducts from industrial wastes. A wealth of background information—working methods and data you can use to profit, are embraced in this single volume.

PUBLIC WORKS MAGAZINE

310 East 45th St. — New York 17, N. Y.

maximum density, and to form the surface soil into windrows containing 8 cu. ft. per lineal foot. Nearly all preliminary grading and shaping has been done with motor graders. A bulk cement spreader is used to spread cement on the windrows formed by the grader. This machine is closely followed by a traveling mixer which intermixes $8\frac{1}{2}$ to 11 per cent water with the soil and cement, which averaged about 7 per cent by volume. The damp windrow left by the traveling mixer is spread over the subgrade by a motor grader, and is compacted by a close-following steel tired roller. After final-grade cutting, small amounts of water are added, and pneumatic tire rollers achieve a good finish. This is sealed with an asphalt emulsion and the street completed with addition of $2\frac{1}{2}$ in. of bituminous concrete wearing course.

• • • "Jack" Ritter

(Continued from page 14)

construction, 64% felt that highway building is proceeding too slowly, and 56% favor spending more money for highway construction even if highway user taxes must be increased (state legislators, please note). Pennsylvanians do not favor bond issues for highway financing, since only 44% of the persons interviewed indicated approval of this method of financing.

Salaries—We fell to thinking the other day about the salaries of highway engineers. Our thoughts were prompted by an examination of the latest survey of the salaries of engineers employed by the state highway departments, recently released by the American Road Builders' Association as a part of its continuing program directed toward the advancement of highway engineering as a career.

In our daily work we continually face the problem of trying to interest young engineers in making a career in the highway field. It's a pretty discouraging proposition these days for several reasons, including the fact that a third or more of them go into military service upon graduation. However, the basic reason for the lack of interest which many of them display is simply the inadequate salary scale offered by the majority of governmental agencies which deal with highway problems. In many states the salary scale for engineers in responsible positions is a disgrace, when viewed from the standpoint of the engineering qualifications and

years of service required of persons filling these jobs, and the responsibility that goes with them. For example, in many state highway departments the typical district engineer is responsible for directing an annual program of construction and maintenance totalling several million dollars. Yet, on the average, for all the state highway departments, the district engineer's salary is only slightly more than \$7000 per year. Even worse, the next position on the salary scale, that of resident (or project) engineer, carries an average salary almost \$2000 lower. This is the position, or one comparable to it, toward which the average young engineer entering a typical organization of this type can aim for over a period of time—perhaps 5 or 10 years. In other words this is the young engineer's goal during his early years in the organization.

To us, this is the weakest link in the whole set-up. This is not a particularly attractive goal for an alert, intelligent, energetic young graduate today, in comparison with the competitive salaries being offered by private organizations, including industry, consulting engineers, and contractors. You may

mention other factors which may make employment in a government agency attractive to some graduates, but the key is still salary, both immediate and future. The average starting salary for last year's graduates in civil engineering from our institution was \$333 per month (it is still higher at some schools) and the top nearly \$400. In two years, practically all of these boys will be making \$125 per week, or more. How can the typical highway agency compete with this? The answer, in many cases, is simply that it can not.

Why do we worry about it? Simply because not enough promising young engineers are entering the highway field eventually to take the places of the outstanding older engineers who occupy key positions today. This means that, unless we make a determined effort to attract these young people, highway agencies are going to suffer from a lack of the kind of leadership which has built our great highway and street system. Part of this effort must be continued action toward increasing salaries and the advancement of highway engineering as a career on the part of all of us.

Foul-Up—This is being written

Soil-Cement Pavement Withstands Washout



ALTHOUGH not generally recommended for structural applications, the accompanying photograph shows how a section of 6-in. soil-cement pavement spanned a washout of the underlying soil. This pavement was carrying normal traffic when the washout area was discovered. The cavity is about eight

feet long and extends four or five feet beneath the pavement. Located on the Cotton Grove Road about four miles east of Jackson in Madison County, Tennessee, the soil-cement pavement was built in the fall of 1951. A bituminous surface was placed later, using the soil cement base.

shortly following the first major storm of the winter season along the Eastern seaboard, a foretaste of things to come. This storm was severe, but highway and street crews did a good job of keeping major arteries open, except adjacent to the sea where high tides put some roads under water. What impressed us the most, however, was the complete foul-up of forecasting done by the U. S. Weather Bureau, which was several hours behind the storm all during the day. How can maintenance crews be prepared adequately and function properly when the weather people apparently have no notion of what is going to happen? Let's get on the ball, boys.

Foamed Asphalt—A recent item in *NERBA*, the fine bi-weekly publication of the New England Road Builders' Association, tells of the relatively new "foamed asphalt" process which has been developed by the Barrett Division of the Allied Chemical and Dye Corporation. This process, which is used in the construction of bituminous macadam pavements, was demonstrated in Maine. The method is based upon the introduction of a small quantity of water into the hot asphalt in order to increase its volume and penetrating activity, with the objective of effecting more thorough coating of the aggregate. According to the report, the foaming binder expanded tremendously, seething into the voids in the crushed stone layer and coating the undersides of the stones to the full depth of penetration.

From Here and There—Charles M. Upham, former engineer-director of the American Road Builders' Association and internationally known highway consultant, has recently accepted an assignment to determine ways and means of developing a modern highway system in Egypt. New Jersey's oldest portland cement concrete pavement—Route 24 near New Village in Warren County—is being resurfaced after more than 40 years of service. A recent estimate by the Citizens Traffic Safety Board places the cost of traffic congestion in New York City at more than one billion dollars every year. E. J. James, Chief Engineer of the Louisiana State Highway Department, recently went on record in stating his belief that a gasoline tax of 10 cents per gallon could be successfully levied and collected in each state, provided that the highway user is assured of the benefits which would result.

LIGHTING and TRAFFIC Control

High-lift Tractor Attachment Aids Light Maintenance

Street light maintenance is one of the many jobs that can be done with a hydraulically operated, high lift tractor attachment announced by



the American Road Equipment Company of Omaha, Nebraska. Called the Model 30, 4-Way, this equipment is described as an all-around construction and light maintenance piece which can push, load and lift 3,000 pounds up to 27 feet in the air. Besides the platform, shown in the accompanying picture, which has a heavy steel frame and removable guard rail, four feet square,

the basic unit can be fitted with a bulldozer blade 6 ft. 6 in. wide, a V snow plow 6 ft. 8 in. wide, and other attachments.

MANUAL OF TRAFFIC ENGINEERING STUDIES

This is a completely revised and greatly expanded edition of the manual first published in 1945. The 278-page book covers 28 different traffic studies giving complete details and instructions for carrying them out. The necessary personnel, equipment, forms, etc., are listed for each study. These studies cover accidents, motor vehicle operation, sign and signal observance, parking, transit operation and other phases of traffic engineering.

In addition, other sections deal with the origin, financing, and planning of surveys, as well as the analysis of traffic trends; statistical treatment of traffic data; comparing before and after studies; drawing up questionnaires; and preparation of traffic study reports.

Published by the Accident Prevention Department of the Association of Casualty and Surety Companies, 60 John St., New York 38, N. Y., the price is \$3.75 (1-10 copies); or \$3.30 (over 10 copies).



Courtesy Union Metal Mfg. Co.

● **OVERHEAD** directional signs, such as these on US Route 27 near Lansing, Mich., provide quick and easy-to-read information for to-day's high speed traffic. On this installation, tapered steel poles and tapered cross beams are used. Poles and beams vary in diameter and gauge to meet span lengths and sign size and weight.

PUBLIC WORKS DIGESTS

THE WATER WORKS DIGEST

The Practicability Of Rainmaking

The astounding claims made by commercial rainmaking firms in 1950 are no longer accepted by the public. In 1951 the Colorado Agricultural College made an impartial scientific investigation and reported finding no evidence that the natural precipitation in north-central Colorado had been altered by rainmaking operations; nor proof, either, that the art won't work. However, if anything is happening artificially, it is of rather small magnitude and it would take years of truly scientific evaluation under adequate control to determine its significance. A Congressional bill has passed the Senate which would set up a national committee to study artificial nucleation and render a final report within two years on its possibilities.

"Rainmaking: Its Present Status." By T. H. Evans, Dean of Eng., Colorado A&M College. *PUBLIC WORKS*, November.

Analyzing Industrial Water

A task group appointed by the ASTM to set up a scheme for the analysis of industrial waters has reported a plan which includes a comprehensive list of properties and constituents in industrial water for which analyses are made, and the order of application of the many methods for chemical and physical measurements. This will provide a basis for further studies, and will give governmental agencies and industry a common ground for studying water quality in streams and other water supplies.

"Method of Analysis of Water Announced." *Midwest Engineer*, October.

Removing Radioactive Materials

If radioactively contaminated water is to be used for drinking pur-

poses, it is necessary to consider the level of contamination, the amount that can be removed by treatment, and the maximum permissible concentration values. If these last are exceeded, it is necessary that decontaminating water purification procedures be initiated. To what extent coagulation would be effective in decontamination was investigated at the Oak Ridge Laboratory. Experiments using a ferric chloride-limestone and alum-limestone coagulation led to the following conclusions: 1. More than 98% of cerium 141, 144-praseodymium 144 and zirconium 95-niobium 95 was removed from water by ferric chloride and limestone coagulation. 2. Cobalt 60 was difficult to remove from water by coagulation. 3. Iodine 131 was difficult to remove by coagulation, although a relatively high figure of 63% was obtained using 100 ppm of ferric chloride. 4. For most of the radioisotopes investigated, ferric chloride and limestone gave slightly higher removals than alum and limestone under similar test conditions. 5. Increased dosages generally yielded only slightly higher removals in the range of dosage and pH studied.

"Removing Radioactive Materials From Water by Coagulation." By William J. Lacy, Chemist, San. Eng. Branch, Fort Belvoir, Va. *Water & Sewage Works*, October.

When Rapid Sand Filtration Is Advisable

It has been demonstrated that, in some plants, it is impracticable to filter water at rates much higher than the 2.0 gpm per sq. ft. which has been considered as standard. The higher rate permits economy of construction and operation, but it must not be assumed that such economy is practicable in all cases. Higher rates of filtration generally necessitate use of coarser sand; and in most cases, the production of high degrees of purification by use of such sand involves more effective

pretreatment of the water, or a water which naturally, at all times, requires a minimum of filtration. Filtration at 3, 4, or more gpm can not, therefore, be accepted as a standard for general use. The AWWA specifications contain a note that the use of coarse sand is applicable only when pretreatment is consistently good; when the highest degree of filtration is not required; when benefits from longer filter runs and use of less wash water offset any disadvantage from lower water quality; and when filter design will permit the necessarily high backwash rates. Plants built for the conventional 2 gpm can be operated at higher rates where peak consumption occurs during the summer; where critical raw water conditions occur during the summer months when water temperatures are favorable to coagulation; where the raw waters involved do not fluctuate so rapidly that suitable changes cannot be made in chemical dosage to insure effective pretreatment; and where ample flocculation facilities are available. The making of suitable changes in the chemical dosage involves the use of technical supervision, and since such supervision ordinarily is not available at small plants, rapid filtration is less often practicable for such plants than for large ones which maintain the men and facilities which are necessary for such supervision.

"High Rate Filtration of Water in Rapid Sand Filters." by C. R. Cox, Chief, Water Supply Section, New York State Dept. of Health. *Water & Sewage Works*, October.

Reservoirs for Potable Water

The AWWA Committee on Potable-Water Storage Reservoirs has prepared a report which, although it is "an essential consensus among the advanced thinkers in the industry, its terms are to be taken as recommendations rather than mandates." It does not apply to natural

or artificial stream-fed lakes or impounding reservoirs. It is based upon returns of 53 questionnaires from state and provincial engineers in the United States and Canada. These support the opinion that few open reservoirs can continuously deliver satisfactory water with physical, bacteriological, and biological qualities meeting present-day standards. The U.S.P.H.S. "Manual", prepared in 1946, recommended that "no unprotected reservoir... should be permitted." If "unprotected" means absence of fencing and other safeguards, the committee agrees

with this. But it does not believe that the use of all open reservoirs need be prohibited. However, it feels both justified and obligated to make strong recommendations for: 1. The covering of all potable-water storage reservoirs to be constructed in the future. 2. The serious consideration by individual water works officials of these possibilities in order of preference: (a) covering each existing open reservoir in the not too distant future, or (b) providing automatic disinfection of all water drawn from any open reservoir, unless an ample residual of a disin-

fecting agent is at all times carried through the reservoir to the distribution system.

Recent innovations for reducing costs of covered structures include prestressed concrete tanks with a thin, gunited dome roof; steel tanks with plywood roofs on steel girders; all-welded steel reservoirs up to 10-mil. gal. capacity; and concrete reservoirs with roof slabs supported by 4-in. cast-iron pipes, up to 7-mil. gal. capacity. The cost of a new covered reservoir is generally 15-20 percent higher than that of an open reservoir.

"Potable-Water Storage Reservoirs." *Journal AWWA*, October.

Activated Silica In Water Treatment

Activated silica is a negatively charged colloidal particle formed by the reaction of a dilute sodium silicate solution with a dilute solution of an acidic material or other activant. Activated silica sol has often been applied successfully as a coagulant aid. The three methods of silica activation most widely used employ sulfuric acid, alum or ammonium sulfate. An additional method developed recently involves the neutralization of the alkalinity by the use of carbon dioxide. Another method coming into wide favor at present utilizes gaseous chlorine for activation.

"Activation of Silica for Use in Water Treatment." By Charles A. Black. *Journal AWWA*, October.

Controlling Algae in Reservoirs

Kansas City, Kansas, has adopted a new method of removing algae from the floor and sides of a reservoir which has an area of 101,736 sq. ft., all of which becomes covered with algae deposits $\frac{1}{8}$ to $\frac{1}{4}$ in. deep. The old method was hand scraping with steel scrapers. The new method uses two 7.3 hp gas-powered Tennant K floor machines fitted with 1500 rpm cylindrical wire brushes each guided by one man. As the machines move forward, 3 fire hoses play water before and behind them, loosening the deposits and flushing them out through the drain. This method does a more thorough job and requires 132 man-hours as compared to 146 man hours by hand scraping.

Westfield, Mass. last winter experienced tastes in its water in the coldest weather due to algae in its reservoir. As the 630 mg reservoir was covered with ice 16 in. thick, applying copper sulphate was diffi-



PLASTIC BASE JC-60 CUTS SEWER SYSTEM COSTS

THESE ARE THE FACTS: JC-60® cuts sewer line maintenance costs. Joints poured with ATLAS JC-60 resist the common causes of sewer joint failure — root penetration, climate extremes, normal settling, loss of adhesion and chemical attack.

Operating costs go down. By reducing infiltration of soil water, JC-60 sewer joints reduce pumping costs and equipment capacity required at the disposal plant.

Installation costs go down. JC-60, with minimum shrinkage, high fluidity and resistance to overheating deterioration speeds the entire jointing procedure and minimizes material waste.

Years of ATLAS research created this remarkable new jointing compound. Based on a synthetic plastic, JC-60 is designed specifically to provide those characteristics proved most desirable in actual use.

COMPLETE FACTS are in Bulletin M20-3 and other technical literature. Write for your copies.



OTHER ATLAS JOINTING MATERIALS include GK® and SLIPJOINT GK® for sewer pipe; MINERALEAD® and HYDRORINGS® for cast iron water pipe.

ATLAS JOINTING COMPOUNDS

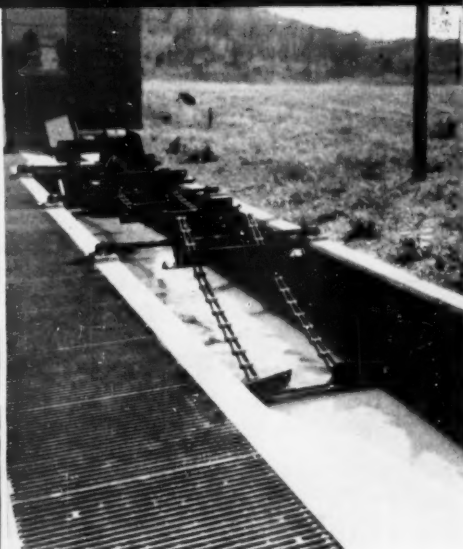
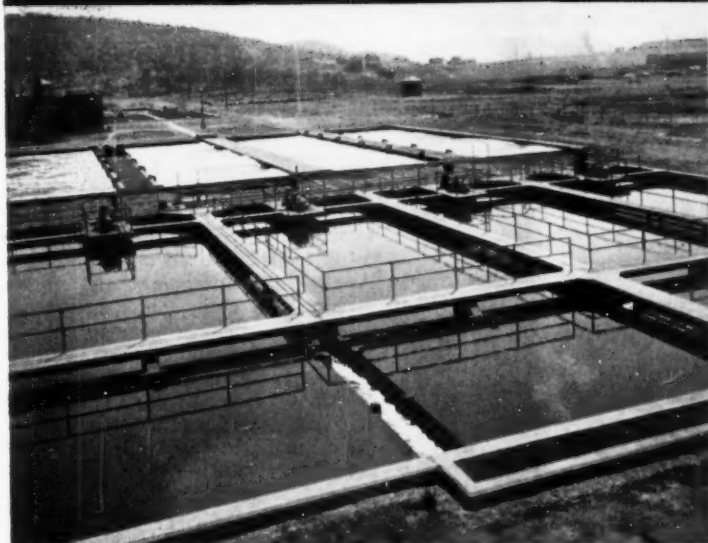
... a permanent bond



Engineering Representatives Throughout the United States

Need more facts about advertised products? Mail your Readers' Service card now.

JEFFREY "goes to town"...



... in the hills of Pennsylvania

Altoona, Pa., as hundreds of other municipalities in the nation, called on Jeffrey for the most modern engineered equipment for treating sewage. The above illustrations show a part of a coordinated sewage system that Jeffrey engineers designed specifically for Altoona.

City engineers prefer Jeffrey equipment. They like the way Jeffrey engineers help them develop methods for results.

Whether the problem is water, sewage or industrial wastes, rely on Jeffrey experience and engineered equipment. Write Sanitation Division for Catalog No. 833 today.

SANITATION EQUIPMENT

Sludge Collectors • Sludge Elevators • Grit Washers • Grit Collectors • Scum Removers • Spiral Conveyors • Screenings Grinders • Garbage Grinders • FLOCTROLS • Rapid Mixers • Bucket Elevators • Chains, Sprockets



THE JEFFREY MANUFACTURING CO.
ESTABLISHED 1877
Columbus 16, Ohio

IF IT'S MINED, PROCESSED OR MOVED
...IT'S A JOB FOR JEFFREY!

sales offices and distributors
in principal cities

PLANTS IN CANADA, ENGLAND, SOUTH AFRICA

Now's the time to mail this month's Reader's Service card.

sult. Seven men, trying to chop holes in the ice, after working all one morning had scarcely made a dent in the ice. Then a steam thawer used by the water department for thawing hydrants and pipes, was tried and bored a hole in less than 40 seconds. Through this, a 6% solution of copper sulphate was pumped under a pressure of 80 to 100 lb. per sq. in., using 1,000 lb. of sulphate, and the tastes disappeared.

"Rout Reservoir Algae." By O. G. Kerran, Supt., Kansas City, and Harry H. Angell, Supt. Westfield. *American City*, October.

Advantages of Vertical Pumps

Although horizontal double-suction pumping units predominate in waterworks installation, vertical pumps have a good many advantages. They can be installed in less space than can horizontal ones. They can be set low enough to be self priming in many installations. Vertical end-suction pumps lend themselves to the simplest possible piping arrangements. A disadvantage is that double-suction impellers can handle lower net positive suction

heads than single-suction impellers. There appears to be no reason for any great difference in cost between the two types of equipment, or in cost of maintenance. In practice to date, the efficiencies appear to be about the same for the two types, and also the reliability. In a hydraulically balanced double-suction unit, axial thrust is very low. In the vertical unit, the entire load of the rotating parts must be carried by a thrust bearing, and in some units the hydraulic thrust also. Guide bearings for vertical units carry no appreciable load, whereas the horizontal shaft bearings are continuously loaded, and on one side only. As to lubrication, wearing rings, packing and other minor points of comparison, there appear to be no controlling advantages for either type. There would appear to be no reason to question the suitability of vertical end-suction pumps for the one zone in which to date they have had very little use—capacities under 14 mgd at heads higher than 60 ft.

"Application of Vertical Pumps to Water Works Installations." By Thomas M. Niles, Consult. Engr. *Journal AWWA*, October.

Vertical Short-Coupled Turbine Pumps

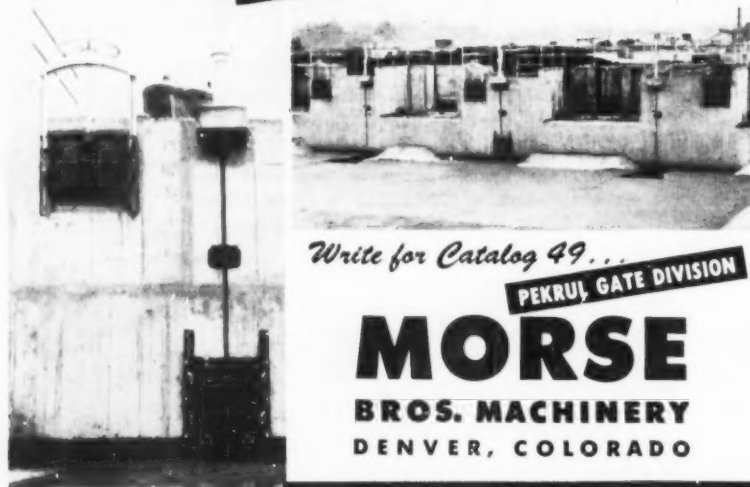
"There is a definite trend from the horizontal to the vertical type of pump for use in public water systems" and many industries. The short-coupled vertical pump can be arranged for either underground or aboveground discharge, and is admirably adapted for such operations as booster cooling and circulating, ground drainage, air conditioning, fire protection, and general-purpose pumping. Short-coupled pumps should be considered apart from deep-well pumps. When fitted with an open suction and taking water from a free pool they may create secondary currents conducive to the formation of whirlpools moving about the pump suction, therefore the proper impeller submergence is an important consideration. The author discusses at length the calculation of submergence and size of suction well; also the special thrust problems presented. The motor and pump shafts should be tied together to take care of all anticipated thrust variations. As the motor and pump are directly connected, they must be in alignment. The hollow-shaft motor must be concentric with the pump shaft. The nonreverse ratchet in the motor can be eliminated. So also can be the self-re-



Pekrul Gates

All sluice gates installed in the United States Steel Corporation's huge, new Fairless Works, Fairless Hills, Pa., were designed and manufactured by PEKRUL. Shown here are several gates among approximately 200 PEKRUL gates installed in pump stations and sedimentation basins.

Put PEKRUL to Work for You!



Write for Catalog 49...

MORSE
BROS. MACHINERY
DENVER, COLORADO

PEKRUL GATE DIVISION

lease pins at the drive coupling with a motor equipped with a bearing capable of handling an upthrust equal to 30% of the downthrust. In recent tests, one single-stage pump operating at 1765 rpm against 37½ ft. developed 85% laboratory efficiency; another at 1190 rpm against 50 ft. head developed 90% efficiency.

"Vertical Short-Coupled Turbine Pumps." By A. O. Fabrian, Layne & Bowler, Inc. *Journal AWWA*, October.

Other Articles:

"Protecting a Water Main Under a Bridge." By P. C. Karalekas, Chf. Engr. Springfield, Mass. Water Dept. Protection against crushing of a main laid at a depth of 26 ft. *PUBLIC WORKS*, November.

"Texas Water Problem: A Suggested Solution." Bureau of Reclamation plan for bringing water from areas of abundant supply to those of deficient supply through a canal 500 miles long." *PUBLIC WORKS*, November.

"Water and Sewage Chemistry." Continuation of a series of articles *PUBLIC WORKS*, November.

"Shallow Caisson Wells." By Wallace M. Graves, Manville, N. J. obtains supply from Raritan River through 10 ft. wells sunk 60 ft. from river bank. *American City*, October.

"Liquid Chlorine: Recommended Procedures in Use at Water and Sewage Plants." From a report by the Joint Committee on Chlorine Supply. To be continued. *Water & Sewage Works*, October. *AWWA Journal*, October.

"Miami Learns a Better Way to Soften Water." By Russell J. Brehm, Supt. of SW water plant, Upflow through sludge blanket, using activated silica. *American City*, October.

"Promoting Better Public Understanding of What Water Works Service Is Worth" A panel discussion. *AWWA Journal*, October.

"Motor Drives for Water Pumps." By M. C. Boggis and F. O. Potthoff, Engrs. General Electric Co. *AWWA Journal*, October.

"Management and Operation of Saginaw—Midland Water Supply System." By Alfred Eckert, Mgr. *AWWA Journal*, October.

"Proposed Revision of Utility Accounting System." Committee Report. *AWWA Journal*, October.

"Critical Factors in Fluoride Distillation Technique." By Stephen Megregian and Ira Solet. *U.S.P.H.S.*, *AWWA Journal*, October.

Oxidation Ponds

(Continued from page 90)

serving a city of about 25,000, with a sewage flow of a little over 2 mgd., discharges about 600 lbs. dry weight of algae per day.

While the bacteria are important as the agents responsible for the

actual oxidation of organic matter, it is desirable that the effluent be as low as possible in viable bacteria, and particularly in pathogens. Most oxidation ponds show a rather remarkable reduction in bacterial count between the influent and effluent; several workers have commented particularly upon the low and frequently negative coliform index of effluents. Caldwell¹⁹ states, "The astounding efficiency of these ponds in removing coliform bacteria is believed to be due to the liberation of substances toxic to bacteria by the algae. It is known

that the alga *Chlorella* produces such a substance . . . It should be noted that the high bacterial reductions cannot be attributed to high pH values."

Another theory is that the long storage period with subsequent settling, and the extreme competition between the organisms is responsible for these remarkable reductions.

Gettys¹⁹ in a study of the sewage treatment plant at Decatur, Texas, observed the trend of reduction of total coli-aerogenes plate count through the plant (using the aver-

















BUILDERS Water Works Controllers are standard throughout the water works field. Extra-heavy, extra-sturdy . . . they're built of materials selected for maximum strength and durability. Designs are extremely simple — adjustments and repairs are easily performed by the average water plant mechanic. You can be sure the controllers specified for your plant will outlast the bonds which cover their cost — specify BUILDERS Water Works Controllers! Builders-Providence, Inc., 356 Harris Ave., Providence 1, Rhode Island.

BUILDERS

INDUSTRIES PIONEERS IN METERS AND CONTROLS BUILDERS

Write for Bulletin

age of the total coli-aerogenes plate count as a result of 12 samples at each station taken at weekly intervals for 12 consecutive weeks), as follows: Organisms per milliliter in raw sewage, about 5,000,000; Imhoff tank effluent, about 30,000; high rate trickling filter effluent, about 3,000; effluent of oxidation pond #1, about 1,000; effluent of pond #2, about 400; effluent of pond #3, about 20.

Engineering of Oxidation Ponds

An important consideration in over-all design is that maximum flexibility, control, and flow measurement be provided. Flexible operation should be possible in control of depth, provision for recirculation, and ability to cut one pond of a series out of operation if and when necessary. Where evaporation or seepage losses are high, or where ponds are used in parallel, outlet structures fitted for simple flow-measuring weirs should be used in each pond.

The earlier studies on oxidation ponds which indicated satisfactory results with BOD loadings approximating 50 pounds per acre of surface area have been repeatedly confirmed. Therefore, the present recommended loading for these units remains at 50 lbs. BOD per acre. These same studies have revealed some oxidation ponds apparently capable of absorbing and satisfactorily treating overloads up to 500% for short periods of time without deterioration of the effluent. It must be stressed however, that overloads in this range can be absorbed only for a limited time. If continuing overloads are to be expected, the ponds must be enlarged or preceded by some other type of oxidation process, or most undesirable conditions will be created.

The effective depth maintained in the ponds bears an important relationship to the production and maintenance of dissolved oxygen throughout the depth of the pond and the freedom from vegetation and higher water temperatures. The ability of algae to live and produce oxygen at any given depth appears to be directly related to the sunlight penetration. With heavy algae blooms, and normal turbidity, it has been observed that oxygen production cannot be expected at depths much greater than three feet. Further, it is known that vegetation in ponds will be discouraged if a water level of from 2½ to 3 feet is maintained. Then too, even though shall-

lower depths might theoretically be more efficient in the matter of maintaining dissolved oxygen through the entire depth, the matter of elevated temperatures in the shallow ponds must be taken into consideration. For these reasons an optimum depth of 2.5 to 3 feet is now recommended.

The question as to the shape of the ponds, or the construction of a single large pond in preference to several ponds in series has not been resolved. There are now in operation ponds of almost every shape and description, ranging from a single pond of about 800 acres surface area to multiple stage contour ponds of only a fraction of an acre. Apparently the most important features to be considered in relation to shape are (1) the provision for the entering sewage to be quickly mixed and distributed so that local septic areas are prevented and (2) assurance of uniform flow through the pond. Several methods have been utilized in an attempt to meet these conditions, such as, baffles through a large single pond to prevent short circuiting, the use of multiple inlets, and recirculation of pond water.

The institution of baffles in a large single pond, and the construction of long flow-through type ponds generally have the same net effect, in that short circuiting and dead areas are overcome. Excellent results have been obtained by recirculation of algae-laden water from one of the final ponds or in a single pond from near the outlet, either back through the primary settling tank, or directly to the primary effluent. This recirculation apparently results in quicker mixing of the wastes with the pond contents and supplies a heavy concentration of oxygen to help supply the large initial deficit which might be expected to occur near the inlet structure. The amount of recirculation required to bring about these conditions has never been definitely established, and probably should be determined by experimentation at each installation. It would appear reasonable to assume, however, that recirculation ratios of from 15 to 50% should prove satisfactory.

To prevent heavy inlet concentrations and dead areas, the use of multiple inlets into a single pond, or a series of ponds which might operate in parallel has been proposed. Multiple inlets would reduce the initial influent loading on a relative basis, in that the highly concentrated entering wastes would be distributed more evenly over the

pond, and quicker mixing with the oxygen-rich water of the pond would be realized. If properly located, these multiple inlets could also serve as an excellent method of reducing short circuiting.

The inlet and outlet structures usually provided are rather simple. In most instances the inlets consist of a supported pipe, submerged below operating depth and protected by some type of headwall or similar structure. In some instances the outlet structures consist merely of large diameter concrete pipe placed vertically on a foundation slab, the upper lip of the pipe acting as an effluent weir. The effluent line emerges from the lower section of the vertical pipe usually near the bottom. Valves or stop gates are provided in these lines when two or more outlets are used. Some designs have provided a valved drain line near the pond bottom to facilitate dewatering.

Since there is a very good possibility of wave action being set up, especially in the larger ponds, practical considerations indicate that at least two to five feet of freeboard should be maintained on the dikes. For this same reason both the interior and exterior banks of the ponds should be protected from erosion. This might be accomplished by sodding the banks with a suitable grass, rip-rapping, or paving the banks with asphaltic compounds or gunite. To facilitate maintenance, the width of the berm should be sufficient to allow the passage of a tractor equipped with power mowing equipment. The interior banks of the dike should be as steep as possible to minimize marginal shallow water.

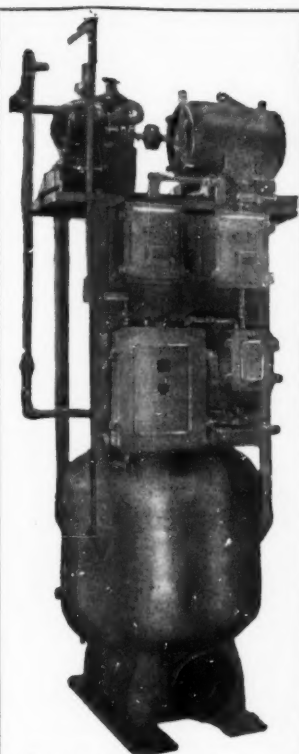
In considering possible locations for oxidation ponds, the type of soil encountered must be investigated. Since it is a recognized fact that proper pond operation is dependent upon the maintenance of a certain water surface area for a given loading condition, the ponds should be practically impervious to prevent seepage losses. For this reason it is not recommended that oxidation ponds be constructed in loose sandy or gravelly soils, unless provision can be made to waterproof them by the use of some sealing process.

Maintenance and Operation

The maintenance required for oxidation ponds is rather simple. However, this simplicity should not be rationalized to the extent that no maintenance is provided since the success or failure of the installation

is dependent upon this point. In the design and construction of oxidation ponds every effort is made to discourage marginal vegetation growth and to assure immediate mixing of the incoming water, uniform flow, and maximum sunlight intensity on the pond surface. However, in the best designed ponds, cat-tails, willows, and various weeds will make inroads into the ponds, especially on the interior banks and for a short distance into the water. The principal and most important maintenance required therefore, is the control of these growths. Most ponds are constructed to facilitate maintenance of this type by the use of power mowing equipment. The practice of vegetation destruction should be initiated soon after the ponds are placed in operation, because in the early stages of development it is possible to control effectively all types of growth by mowing. This type of maintenance should be put on a regular schedule, the frequency of which will vary between different installations. Selective herbicides, such as 2,4-D, might be effective for the control of broad leafed vegetation. This herbicide will not harm grass planted to control erosion on the banks of the ponds. If the interior banks have been rip-rapped or paved, the use of a soil sterilant might be indicated to control the undesirable vegetation.

Frequent inspections of the pond dikes and piping structures should be made. Any evidence of dike erosion should be quickly repaired to prevent possible loss of the dike, and subsequently the pond. Minor repairs in early stage erosion are much less expensive than the complete replacement of the dike. Frequent inspections of the piping through the ponds and the inlet and outlet structures should be made. Any leaks in the dike around the piping should be quickly repaired, as by grouting. Any large objects collected around the outlet structure should be removed to prevent possible entrance into the effluent line, with a resultant stoppage. Any stoppages in the effluent structure or line must be quickly removed to prevent excessive accumulations of water in the pond which might lead to the loss of a dike. All valves and stop gates employed should be checked and periodically serviced in accordance with the manufacturers' recommendations. Should a recirculation pump be incorporated into the system, periodic checking and lubrication should be per-



Compact ejector system having motor compressor assembly and all controls in one "packaged" unit.

WHY PUMP SEWAGE When You Can EJECT It?

TO LIFT SEWAGE AND SLUDGE
AT TREATMENT PLANTS

USE BLACKBURN-SMITH PNEUMATIC SEWAGE EJECTORS

PREFERRED by most prominent consulting engineers as **LESS MESSY, MORE SANITARY** than centrifugal submerged type sewage ejectors or pumps.

ENDS CLEANING of screens and pumps.

LIFTS STRAIGHT UP, 150 feet capacity, once a minute, without fail.

30 to 500 GPM in both single and twin units against high discharge heads.

NO COMPLICATED PIPING—No place for collection of solids or sedimentation within the pots. **NO WORRY OVER OPERATION** IN WATER WHEN USING THE ENTIRELY PNEUMATIC SYSTEM.

Get Catalog 550 today

ADDRESS:

BLACKBURN-SMITH MFG. CO.,
93 River St., HOBOKEN, N. J.

ROBERTS SERVICE

includes

GRAVITY FILTERS

for all forms of water filtration and softening plants.

PRESSURE FILTERS

for swimming pool recirculation.

WHEELER FALSE BOTTOMS

for filter underdrainage.

and

ROBERTS ZEOLITE WATER SOFTENERS

We invite the opportunity to cooperate with all Engineers and Architects interested in the correction of water for municipal or industrial requirements.

ROBERTS FILTER MFG. CO.

640 Columbia Ave., Darby, Pa.



**INCREASE
SEWAGE PLANT CAPACITY
WITHOUT CAPITAL COST!**

WHAT IS IT?

- BIONETIC is a dry powder of preserved beneficial groups of micro-organisms that accelerate natural biological action.

WHAT DOES IT DO?

- BIONETIC can save money on sewage plant problems including odor control, increased sludge digestion capacity, and scum blanket control.

INTERNATIONAL ACCEPTANCE:

- BIONETIC is successfully used by hundreds of municipalities, industries, resorts, and institutions.



For FREE Literature Write:
A. J. Krell, technical director

Reliance Chemicals
CORPORATION

P. O. BOX 6724 HOUSTON 5, TEXAS

formed in the same manner as it applies to other pumps in the system. Any breakdowns in the pumping equipment should be repaired as soon as possible since this equipment has been designed as an integral part of the system and is necessary to proper operation.

Although mosquito breeding is not expected in ponds which are well designed and maintained, top water minnows (*Gambusia*) might be introduced to provide an additional margin of safety for the destruction of mosquito larvae should they perchance begin to develop.

It has been reported that various types of fish have been introduced into and thrive in several existing ponds.

During the starting period for new ponds, and sometimes after severe overloads or prolonged cloudy periods, a few ponds have become septic. To overcome this, sodium nitrate has been added to the pond. While the exact mechanics of the nitrate action are not known, sodium nitrate is itself an oxidizing agent and also stimulates the growth of algae so that both effects will help to return the ponds

to an aerobic condition. The dosages of nitrate employed have varied, but it seems that the dose should be sufficient to satisfy 5 to 15% of the influent BOD on a pound for pound basis. Various methods of distributing the nitrate have been tried, but broadcasting the material all around the edges of the ponds appears to be as effective as any other method.

References

- 1—State Health Department Files, Correspondence.
- 2—Giesecke, F. E., and Zeller, P. J. Alvin, "Treatment of Settled Sewage in Lakes", Texas A & M College Bulletin No. 47, August 1, 1939.
- 3—Peurifoy, R. L., "Operation of the Kingsville Sewage Treatment Plant", Proceedings 20th Texas Water Works Short School, 1938.
- 4—Hall, Arthur Lee, "Microbiology of the Kingsville Sewage Lake", A thesis, Texas College of Arts and Industries, Kingsville, 1939.
- 5—Blackstone, W. Wheeler, "Land Disposal of Sewage: The Lagoon System," Proceedings 29th Texas Water Works Short School, 1947.
- 6—Ludwig, H. F., Oswald, W. J., Gotaas, H. B., and Lynch, V., "Algae Symbiosis in Oxidation Ponds. I. Growth Characteristics of *E. gracilis* Cultured in Sewage," Sewage and Industrial Wastes, November, 1951.
- 7—Myers, Jack, "Studies of Texas Sewage Lagoons," Public Works, December, 1948.
- 8—Ray, W. R., "Production of Oxygen by Photosynthesis Induced by Artificial Light on Algae in Sewage Lagoons," State Health Department files.
- 9—Caldwell, D. H., "Sewage Oxidation Ponds—Performance, Operation, and Design," Sewage and Industrial Wastes, May 1946.
- 10—Gettys, Charles T., "The Destruction of Enterobacteriaceae by the Sewage Plants of Decatur, Texas," A thesis, North Texas State College, Denton, Texas, August 1949.
- 11—Sullivan, Troy G., "A Quantitative and Qualitative Bacterial Analysis of the Sewage Disposal System of Perryton, Texas," A thesis, North Texas State College, Denton, August, 1950.
- 12—Smallhorst, D. F., Walton, B. N., Myers, Jack, "Oxidation Ponds" Chapter XIII, Manual for Sewage Plant Operators, Texas Water and Sewage Works Association, 2nd Edition (to be published, 1954).

Looking at it from any angle



CLOW MECHANICAL Joint CAST IRON PIPE cuts installation and maintenance costs!

A low-cost installation, a low yearly upkeep—these are first considerations of waterworks superintendents. Clow mechanical joint cast iron pipe gives you both!

Fast installation, rain or shine. Costs are cut right from the start by saving time and labor on installations. No calking is required. Ordinary workmen with ratchet wrenches can do the job in record time, even in wet trenches or under water.

"Bottle-tight" joints with "float-ing flexibility." Every joint is sealed tight as a corked bottle by a heavy rubber gasket confined within the bell under pressure, yet the

joint remains free-floating, flexible to compensate for vibration, expansion, contraction. This leak-free, trouble-free installation cuts maintenance costs.

Long life at low cost. This cast iron pipe assures a *century and more* of service. Here is true permanence, true economy!

Clow mechanical joint cast iron pipe is available in 18-foot lengths, sizes 3" to 24". Write TODAY for helpful, detailed information—ask for Form 12-18-50.

CLOW FOUNDRIES are equipped to produce Bell and Spigot Joint cast iron pipe, fittings, valves and many pipe line specials.

JAMES B. CLOW & SONS ☆
201-299 N. Talmah Ave. • Chicago 80, Illinois



and their National Cast Iron
Pipe Division, Birmingham, Ala.
Subsidiaries:
Eddy Valve Co., Waterford, N. Y.
Iowa Valve Co., Oskaloosa, Iowa

Now's the time to mail this month's Reader's Service card.

PUBLIC WORKS DIGESTS

THE SEWERAGE AND REFUSE DIGEST

Sewage Disposal Progress in 1953

Since 1945, dollar volume of sewage contracts has increased an average of about 30% a year; and in 1953 is running well over 30% ahead of last year. Data obtained from state officials show that, since 1945, 10% more people have been served by sanitary sewers; 22% more people and 30% more places by treatment plants. An increasing percentage of plants provide secondary treatment, and 50% more chlorinate effluents. There are 26% more trickling filters than in 1945, and 25% of them are high-rate. Separate sludge digestion has increased almost 50% and activated sludge plants 42%. Sewage lagooning is increasing.

"Inventory of Sewage Disposal Facilities—1953." *Engineering News-Record*, Oct. 15.

Sludge Conditioning With Ferric Sulphate

San Diego, Calif. treats approximately 38 mgd of sewage, the sludge from which is vacuum filtered after coagulation with ferric chloride. The high cost of this led to the search for a cheaper coagulant, and a test was made of ferric sulphate, the cost of which in San Diego is approximately half that of ferric chloride. An objection to the sulphate is that the reaction forms calcium sulphate, which is not readily soluble and clogs the filter blankets. This clogging is avoided at the Minneapolis St. Paul plant by continuous washing of the blankets by jet sprays, and a similar device was employed in this test. The test data warranted the conclusions that calcium sulphate scale appeared to pass through the filter blanket before it reached the jet spray wash and could not be prevented by spray washing. No definite conclusions as to cost were obtained. It was found that ferric sulphate in the solid form must be kept dry at all times; that the in-

soluble material accumulating in the mixing tank must be removed; and that ferric sulphate produces approximately 20% dryer filter cake than ferric chloride.

"Sludge Conditioning With Ferric Sulphate." By Eric V. Quartly, Supt., Leland Cook, Jr. Asst. Supt., and Jack H. Kuhns, Chemist. *Wastes Engineering*, November.

Molecular Filters For Bacterial Assay of Sewage

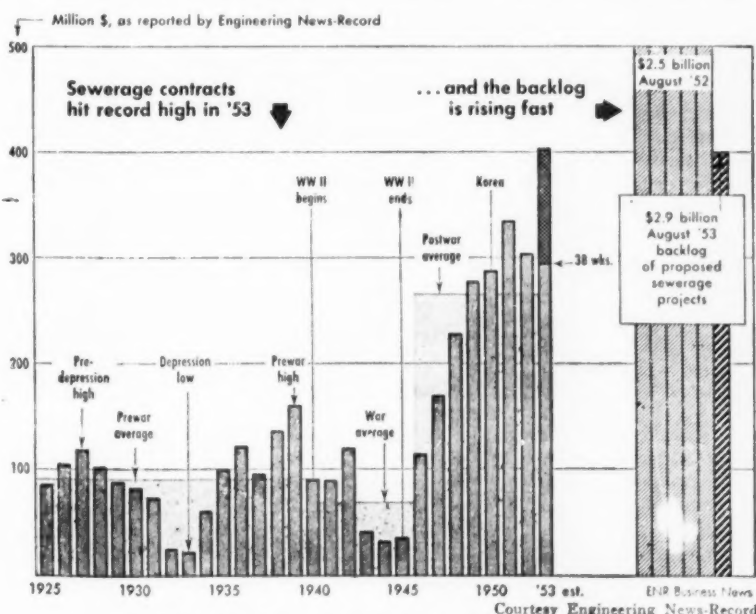
Interest in molecular filter technique has been focused mainly on bacterial assay of water for human consumption. In this article the author presents in brief the various aspects in the MF technique which are generally not in the foreground when the assay of relatively pure water supplies is concerned. The author describes a portable laboratory for performing the tests in the field. He states that the MF technique, in suitable modification for the specific needs of the bacterio-

logical assay of sewage and other waste waters, may prove an economic tool which facilitates surveys and frequent checks on treatment methods heretofore possible only at a major expense and without permanent record. However, a great deal of detailed experience will have to be collected in this field of application before a general code of specific rules can be given.

"Application of Molecular Filter Techniques to the Bacterial Assay of Sewage." By Alexander Goetz, Assoc. Prof. of Physics, Calif. Inst. of Tech. *Sewage and Industrial Wastes*, October.

Sewage Treatment For Resort Areas

The authors discuss the problem as presented by rural resort areas where the town is the only form of local government, taking as an illustration Sullivan County, New York, in the foothills of the Catskill mountains. Here the various resort



● DOLLAR volume of sewerage work is rising fast.

owners have realized the advantages of community action and have acted under state laws, providing for the formation of water, sewer or other districts. In the more thickly populated districts, the cost per year for sewage collection and disposal by this method is less than that by individual disposal. Even where the cost is greater, the growth of the establishment does not involve new problems or new expenditures; there are no restrictions on the use of a property due to the presence on it of a disposal system; and there is considerable value in being able to advertise that the property is served by a public sewer system.

From the engineering viewpoint, a summer resort plant must be designed for the heaviest organic loading and heaviest volume of flow probable. The former usually occurs when the flow is lowest in the stream which receives the effluent. The cost must be reasonable, and the operation simple and economical; and the plant must be suitable for off-season cold-weather operation. The two-stage high-rate filter has been used for most of the small installations in Sullivan County, the design being such that the two filters can be used in winter as standard-rate trickling filters operated in parallel. Primary clarifiers furnish 2-hr. detention periods. Loading for

high-rate filters is 2 lb. of applied BOD per cu. yd. of filter medium 3 to 4.5 ft. deep. Sludge digestion capacity for large plants with heated digesters is in excess of 3 cu. ft. per capita of maximum summer population, and 4 to 5 cu. ft. for unheated digesters. Vacuum filters are provided in the larger plants. Such plants produced effluents during the summer of 1952 containing 12 to 18 ppm of BOD and 10 to 25 ppm of suspended solids. Costs of these plants, which vary in size from 2 to 0.5 mgd, averaged approximately \$150,000 per mg capacity.

"Sewage Treatment for Resort Areas." By Olney Borden, Cons. Engr., and Edward B. Rodie, Man'g Editor *PUBLIC WORKS*. *Sewage and Industrial Wastes*, October.

Biocatalysts and Waste Disposal

For some years efforts have been made to speed purification of wastes by adding pure cultures of bacteria. During the past year there has been great increase of interest in the use of various organic biocatalysts to solve waste disposal problems. The two major types now on the market are concentrated enzymes and concentrated bacteria. In the activated sludge system the addition of bacteria would result in little benefit as to increasing the BOD removal.

Adding hydrolytic enzymes would bring about the breakdown of the complex solids to soluble compounds, which would pass on to the aeration tank, which could absorb the additional load only if overdesigned; and it would reduce the amount of solids sent to the digester. Adding bacteria to the aeration tank might increase the efficiency of the system; but if there are insufficient organisms in the system, the deficiency will be made up by material growth; and it is in the growth phase that the maximum rate of utilization of organic matter occurs. If more organisms are added than can be supported, the surplus will die off. Adding bacteria to the digester may be beneficial if it is not properly designed or operated (as many digesters are not); but the solution is not permanent and must be made on a continuing basis.

"Biocatalysts and Waste Disposal." By Ross E. McKinney, SW Foundation for Research and Education. *Sewage and Industrial Wastes*, October.

Metering at Chicago's Treatment Works

At Chicago's West-Southwest treatment works, the world's largest, there are 286 Venturi meters, ranging in size from 114-in. down to 2-in. for measuring sewage, sludge and air. By use of recent developments in summation instruments and long-distance transmitters, essential flows for control of the entire plant are indicated and recorded on one instrument panel in sight of the plant engineer's desk. The sludge draw-off of each tank is regulated by the use of twelve 2-in. meters which measure the air supply to the air lifts. The total preliminary sludge is measured by two 18-in. meters. Imhoff tank effluent is distributed to the activated sludge batteries through four 100-in. meters, and preliminary tank effluent through four 114-in. meters. The total sludge return is measured by a 78-in. meter, and the waste sludge by 16-in., 12-in. and 20-in. meters. The air supply is measured by 66-in. and 72-in. meters. Also each air supply and sludge handling feature is metered. Experience at this plant and other treatment plants of the Sanitary District, extending over more than 30 years has led to the conclusions that Venturi tube meters give the lowest pressure loss for the same degree of accuracy; that dial indicators give more reliable results than manometers when read by non-technical personnel. Dependable, in-

Sanitary Fill Successful in High Ground Water Area



In Lake Worth, Fla., the water table is quite close to the surface. In some areas, this is considered an unfavorable condition for sanitary fill, though Army experience during the war did not indicate it to be a serious problem. A dragline was used to dig the pit to a point below the water line; normal procedure

is then followed in fill operation. The five collection vehicles used by the city dump their loads at the pit; and the material is then compacted, spread and covered with an International tractor equipped with a bullclam shovel. The fill area is an abandoned sand pit; after completion of the fill, it will be planted.

expensive summation instruments are of considerable value. They believe that there can be too much instrumentation for efficient operation.

"Comprehensive Metering of Sewage at the World's Largest Treatment Works." By Norval E. Anderson, Engr. of Treat. Plant Design. *Water & Sewage Works*, October.

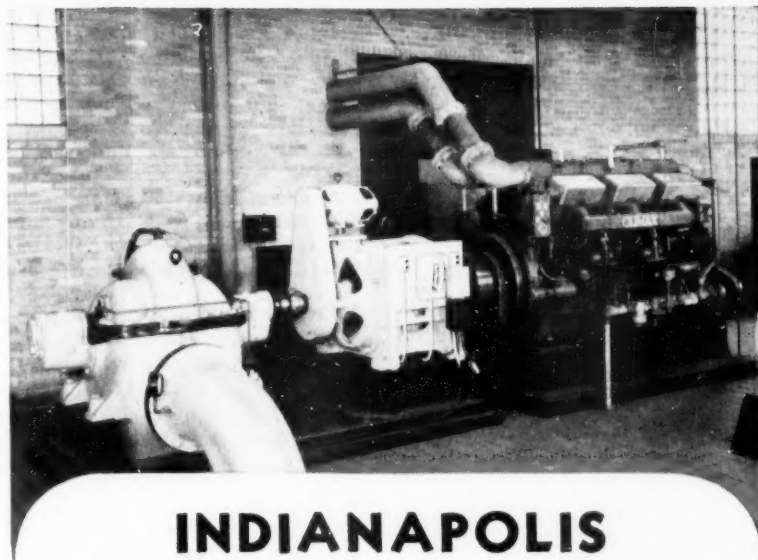
Increasing Filter Plant Capacity

Increasing the capacity of the Finham plant of Coventry, England from 5.75 mgd to 9.25 mgd, without adding any new filters to the 35 already in use, is being effected by preceding filtration by partial purification by activated sludge treatment. It was demonstrated by operation of pilot units that, after 4 hr. aeration, the sewage could be applied to the trickling filters successfully at a rate of 140 gal. per cu. yd. per day. (The settled sewage has a BOD of about 200 ppm.) Air is supplied at the rate of 0.15 cu. ft. per sq. ft. of tank area per min., the tanks being 12 ft. deep. The clarifiers following the aeration tanks have a total detention capacity of 3.6 hr.

"Partial Treatment by Diffused Air." By John Finch, Mgr., Sew. Disp. Dept., Rotherham, England. *Water & Sewage Works*, October.

Out of City Service Connections

The city and county of Denver, Colo. has established detailed regulations governing connections to its sewer system from outside the city. Areas outside the city-county limits not already connected to the sewerage system, can make such connections only after executing a "Connector's Agreement", for which purpose they must be incorporated, with power to impose taxes and operate a sewerage system. The Connector pays all the expenses of installation, and such parts of these connections as lie inside the city become the property of the city. Sanitary sewer facilities must be designed to serve adequately the entire area covered by the agreement when it shall have become fully developed. Complete maps must be submitted showing locations and sizes of the proposed sewers, manholes and other appurtenances. On most connections, meters are required to record both flow variations and total flow. To reimburse the city for cost of reviewing plans and inspecting construction, charges are made of \$10 for filing, \$25 for agree-



INDIANAPOLIS Water Company plays safe with a **climax BLUE STREAK ENGINE**

There must be an uninterrupted flow of raw water from the 32 MGD Fall Creek Pumping Station to the Fall Creek Purification Plant. During any failure of normal power supply there must also be emergency power to operate certain indispensable motors and lights.

The Indianapolis Water Company has assured itself this protection by a unique installation which consists of a 14 MGD low lift pump normally driven by a 100 H.P. synchronous motor, with a Climax 12 cylinder gasoline engine direct connected to the motor through an automatic clutch coupling. During any emergency the engine drives the motor as a synchronous generator with an output of 80 KW in addition to supplying raw water at the rate of 14 MGD.

When dependable emergency power is required you cannot go wrong by consulting Climax.



For complete information write to
ENGINE AND PUMP MFG. CO.

Factory and General Office: Clinton, Iowa
Regional Offices: Chicago, Ill., Dallas, Texas

WATER SUPERINTENDENTS:

Consider the Advantages of Pollard L-P Gas Burner Furnaces

Burns L-P Gas (commonly known as "Bottled Gas"). Thoroughly tested and proven. Melts approximately 50 lbs. of lead in 9 minutes. Flame can be adjusted to maintain desired temperature. One cylinder of gas will operate unit for many hours. Cylinders are made of armor plate.

Catalog No. 26 on Request.

JOSEPH G. POLLARD CO., Inc.
PIPE LINE EQUIPMENT
New Hyde Park, N. Y.



ment processing, and 0.5% of the contract price for inspection plus the inspector's fee; and a permit fee of \$3 for every sewer service connection.

"How Denver Controls Out-of-City Sewerage Connections." *PUBLIC WORKS*, November.

Removing Solids From Effluents

Many English plants find it difficult to produce effluents that meet the Royal Commission standard of not more than 20 ppm of BOD. This, as well as "oxygen absorbed" and ammoniacal and albuminoid nitrogen, are profoundly affected by particles of solid matters found in the effluents from filters, even after double filtration. To learn the importance of this effect of suspended solids, tests were conducted throughout an entire year, filtering through filter paper the effluents from a primary filter and those from a secondary filter. The average BOD results for the year were: Primary filter effluent, 41.5 ppm; the same after paper filtration, 14.5 ppm. Secondary filter effluent, 23.5 ppm; the same after paper filtration 7.0 ppm. Thus, filtering the primary effluent reduced the BOD by 27 ppm, while passage through a second filter reduced it by only 16.5 ppm. The material which causes most trouble in effluents from biological filtration plants is very finely divided matter, extremely difficult to remove by plain settlement. To remove this matter by filtration through paper is, of course, impracticable. But other methods of removal which will approximate such results are available or can be developed. Among these are irrigation and fish pond technique. Methods requiring less area of land include sand filtration and micro straining. Another method is use of chemicals, such as alum or ferric chloride, to effect more complete clarification in sedimentation tanks; or effecting this by mechanical flocculation.

Filtration through rapid sand filters of the type used for water purification can, it has been demonstrated, give results of the same order as those obtained by filtration through paper in the laboratory. The average results for the year 1947 of sand filtration at five Johannesburg sewage works showed BOD of the final effluents reduced to 5.6 ppm, 9.8, 19.3, 18.7 and 7.3 ppm respectively; and reductions in 4-hr. oxygen absorbed by sand filtration of human tank effluents of 26.5 to 13.7; 19.2 to 10.9; 13.9 to 8.9 respec-

tively. To obtain definite information concerning costs and other practical features of actual operation, the Water Pollution Research Board set up at Luton and Coventry pilot scale experimental plants to investigate the mechanical filtration of effluents.

"Polishing Sewage Effluents." By John Hurley, Mgr. Wolverhampton Sewage Works. *Municipal Engineering* (England), Sept. 25 and Oct. 2.

Effect of Detergents On Septic Tanks

A sanitary inspector in England reports that, since the advent of soap substitutes, septic tanks and small treatment plants which previously had operated satisfactorily have been giving trouble. Filters became choked, distributors failed to function and liquefaction and settlement in septic tanks seemed to cease altogether. Many septic and settling tanks contained a substance of the consistency of porridge, often grey in color, which refused to liquify or settle and almost completely clogged the filters. When this material had been pumped from tanks, attempts to restart proper action by seeding were not entirely successful. There was less trouble in villages where the water is chlorinated; and no trouble except foaming at town disposal works.

"The Chemical Detergent Problem." By H. C. Cooper, San. Inspector. *Municipal Engineering* (England), Oct. 16.

Tannery Wastes Treated on Trickling Filters

The Hartnett Tanning Co., in the town of Ayer, Mass. produces tannery wastes which it previously discharged into a pond from which the town took its water supply. This produced conditions endangering the water supply and the State Dept. of Health ordered discontinuance of such discharge, having learned by experiments that no known method of treatment would produce an effluent that could be discharged into the pond; but that settled wastes, if properly diluted with sanitary sewage, could be treated on the standard-rate trickling filters which formed a part of the town's treatment plant and were of sufficient size. The town constructed, for this purpose, two primary settling tanks, another secondary settling tank, and a holding tank to permit discharge of the tannery wastes at a uniform rate. The primary tank effluent is mixed with sewage effluent in a designated ratio and the combination discharged

onto the trickling filter. The tannery wastes were first pumped to the treatment plant on April 17, 1953. Only a part of the tannery waste was applied to the filter at first, but the ratio was gradually increased until all wastes are now being treated biologically.

"Disposal of Tannery Wastes." By Worthen H. Taylor, Assoc. San. Engr., Mass. Dept. of Health. *PUBLIC WORKS*, November.

Sanitary Fill Used as Cover Material

Since 1948, New Orleans has been operating a sanitary fill on low, wet ground. The natural soil is unsuitable for cover material, and at first material for this purpose was hauled in. But it was discovered that material that had been in the fill for only three years had decomposed so rapidly that it could be used as cover for fresh material, and that it had already reduced 30% in volume. At San Francisco, it has been found that material that had been in the fill for 10 yr. was still recognizable. Apparently the moisture content of a fill plays an important part in the decomposition, and the 60-in. rainfall and warm climate of New Orleans hastens the decomposition.

"Sanitary Fill Reused Safely After Three Years." By Carl Schneider, Cons. Engr. *American City*, October.

Slag for Covering Chicago's Sanitary Fill

In making a sanitary fill covering 280 acres of swampy land at the northern tip of Lake Calumet, Chicago collects the refuse by 365 dump trucks, a portion of which, collecting in the most distant part of the city, dump loads into railroad gondola cars which transport the refuse to the fill. Here it is spread in layers 6 to 8 ft. deep and compacted, using an Allis-Chalmers HD-10 tractor. The material is covered by 2-ft. lifts of slag, spread and compacted by a similar tractor. From 160 to 180 cu. yd. of slag is used per day, which is obtained free from nearby steel mills. It makes an excellent haul road for the dump trucks, renders the fill rodent-free, reduces fire hazards, and prevents air pollution. The total cost of moving refuse to the fill comes to 7½ cents a yard. This fill was begun in 1940 and there is sufficient area for ten years to come. It is on state land and may be used for a state park.

"Chicago's Economical Sanitary Fill." By E. J. Knudsen, *PUBLIC WORKS*, November.

Radiation Tracers to Measure Sewage Flow

G. A. Truesdale of the (English) Water Pollution Research Board, has reported that, following up the work of Archibald in the U. S. and Knop in Germany in using radio-active tracers to measure sewage flow, he selected, as the tracer element, Rubidium 86. Since its half-life is 19.5 days, only small corrections need be made for decay during an experimental period, and the difficulties experienced in finally disposing of it were much less than with materials with longer half-life. Its radiations are very penetrative and give a high counting efficiency; the counting efficiency of radio-iodine was only 5% of that obtained with Rb 86. Also, using the latter, less than 0.1% of it was removed from the liquid by adsorption on the humus solids settling in the clarifier.

"Radiocative Tracers to Measure Sewage Flow." *Water & Sewage Works*, October.

Treating Slaughterhouse and Packinghouse Wastes

THE University of Tennessee Engineering Experiment Station has published a "Summary of Treatment Methods for Slaughterhouse and Packinghouse Wastes," embodying information obtained not only from a literature survey but also from private correspondence with state sanitary engineers throughout the United States, from manufacturers of equipment and from city engineers and chemists. This is a thorough, up-to-date coverage of the subject. The following is a brief synopsis of the summary:

The undesirable contents of these wastes can be reduced greatly by removing paunch contents and recovering blood and grease. Whole blood can be used for plywood adhesive; livestock feed; protective colloid or fertilizer ingredient; or processed for byproducts.

Grease should be recovered for it can cause scum formation in primary tanks and difficulties in secondary treatment processes. Recovery of grease is profitable. It is questionable whether, under ordinary market conditions, the expense of adjuncts to such recovery such as aeration, chemical coagulation and aero-chlorination is justifiable unless needed to prevent stream pollution.

Since these wastes are largely organic in character, methods used

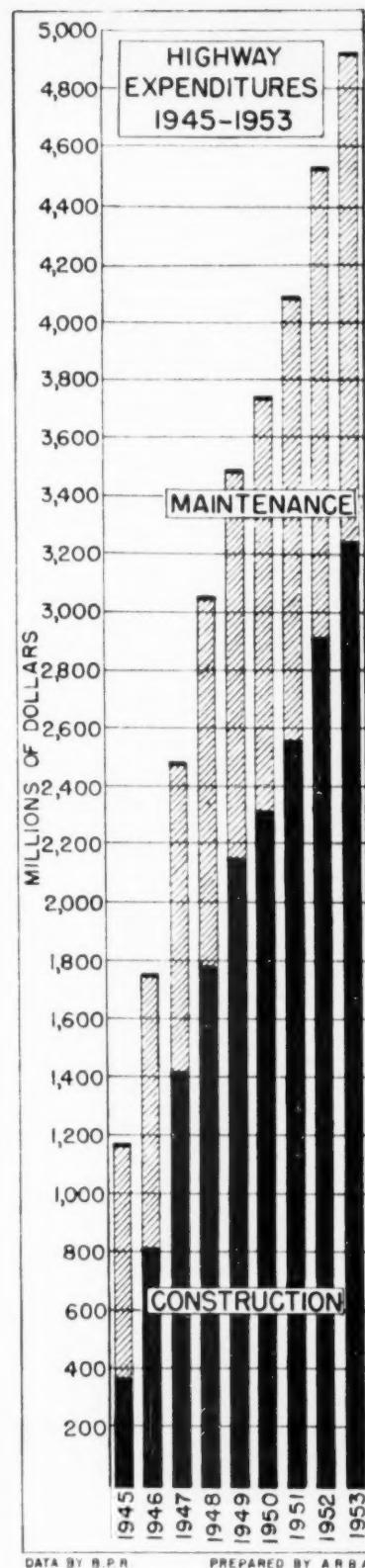
for treating domestic sewage—trickling filters, sand filters or activated sludge—are applicable to them, and it is most economical to discharge them into municipal sewers; but pretreatment is generally desirable. Small slaughterhouses in certain areas have obtained satisfactory treatment with settling tanks or septic tanks followed by subsurface disposal fields, leaching pits, dry wells, filter trenches or filter beds, if grease, blood and paunch manure have been carefully removed prior to treatment. More positive treatment is obtained with chemical coagulation (chlorine, ferric chloride), sand filtration or high-rate filtration.

Wastes from large packinghouses have been treated successfully in admixture with municipal sewage (after pretreatment) at rates up to 90%. Where treatment at a municipal plant is not possible, treatment by similar methods without admixture with sewage can be employed successfully. Among the various methods employed, in addition to grease removal, are: (1) Mechanical flocculation, settling, low-rate filtration and final sedimentation. (2) Primary settling, high-rate filtration, intermediate settling, low-rate filtration and final sedimentation. (3) Primary settling, aeration, secondary settling, low-rate filtration and final settling. (4) Screening, primary settling, primary filtration, intermediate settling, standard filtration. (5) Conventional trickling filter plant.

Snow Melting on Boston's Aerial Highway Ramps

The new Boston Expressway will have heating pipes installed in the ramps to prevent snow and ice from causing traffic congestion. Each individual ramp has its own snow melting system, with pump, heat exchanger and pipe units. The total area served amounts to more than 161,000 sq. ft. of pavement and involved the use of about 200 tons of 1-inch and 2-inch wrought iron pipe. This pipe is welded into grids, 10 ft. by 22 ft., and is buried in the concrete pavement.

Water mixed with Ethylene-Glycol anti-freeze is circulated through the heat exchangers and pipe networks. Each system is designed for automatic or manual operation, or a combination of both. Thermocouples are embedded in the concrete to permit a more comprehensive study of the snow melting system under actual operating conditions.



DATA BY B.P.R.

PREPARED BY ARBA

● MONEY spent for highway construction and maintenance, 1945-53.

How to Get Safety

(Continued from page 82)

ty program in the construction industry than there is pure safety engineering. Therefore, a young, aggressive sales manager or salesman, with a working knowledge of the job, might make a better Safety Engineer than a foreman who knows the job inside out.

Step #4. Find out what your problem is. One of the first things you and your safety man need to know is what accidents are common to the operations on which you have worked and on which you plan to work.

Next, you need to know exactly and specifically the kind of accidents your employees are experiencing. Your present and past insurance carriers can help you on this, in the event your records are incomplete. Knowing you got a man killed, 62 injured and had 183 non-injury accidents last year, all of which cost you \$67,000 is not enough. You need to have the details and the details have to be analyzed, so this is one of the early jobs for your safety man.

Next, you need to determine how you will investigate, analyze and report accidents in the future. You will likely find the reports of past accidents hardly go beyond the barest essentials of alibi excuses on the causes of accidents. Note the reference is to causes and not to any deficiency in present factual reports. For example. Some reports will show "Carelessness" as a cause. That doesn't help much. If you are to prevent accidents you need to know who was careless, why was he careless and what will prevent a repeat performance of like carelessness.

Other reports may show "Improper Supervision" as a cause. That isn't enough. You need to know in what way the supervision was improper or incorrect and what

corrective training measures or orders need to be given to keep this "improper supervision" from happening again.

Likely you will find listed as a cause "low-grade help." That kind of feeble explanation doesn't help much. The thing to be determined, if this is the true cause is, "can we get a better grade of workers? If so, can we afford them?" If we can't get a better grade of workers, then what do we need to do to train the ones we have to use?

You will likely find as another cause or excuse "lack of training and knowledge of the employee." You need to know specifically and actually in what way the training was inadequate. Whose training was it that was short? Sometimes when lack of training and lack of know-how on the part of the employee is charged as the cause of the accident, the rightful cause is lack of training ability, and know-how and willingness, and desire on the part of a foreman or superintendent.

So, in the beginning, make a thorough investigation and determine insofar as possible, the actual cause of mishaps. Fix and tie down responsibility for those mishaps. In doing this you are not trying to fix blame and find a whipping boy. You are finding causes and fixing responsibility so that like occurrences can be prevented.

In this discussion of accident reports and the analysis to show the true cause, do not confuse the mass of reports which you are already required to fill out with the report which will show the cause.

A person cannot sit at a desk and analyze reports and tell you what is causing your accidents. He must go on the job. Have a look. Have a talk or several talks. And, find out who or what failed. Then find out how that same failure can be prevented in the future.

Next, and more important, this information must be channeled down to the men so they will know what

things to do, and what not to do.

In doing this you need to know what type of work sheets, report forms, and analysis sheets you will need in getting this information and analyzing it.

Designing your accident report forms for your operation is an individual matter. It's like trying to suggest how one would drill a hole, when you do not know what size, how deep, how many and what material.

Here are a couple of suggested forms, one is an Accident Analysis Sheet for prevention purposes. The other is a Job Analysis Sheet for outlining the hazards and way to reduce them, prior to the job and the mishap.

Step #5. Know what the job of your safety man will be. When you appoint your safety man condition yourself to the fact that you are giving him eight or more different jobs. Your successful safety man will have this to do:

1. He will be a statistician who will maintain and analyze and interpret your accident record.
2. He will be an investigator to assist, train and guide your supervisory staff in the investigation of all accidents and near-accidents.
3. He will be an inspector, not in the sense that he snoops around with a checklist in his hand and looks personally for hazards and dangerous acts, but he teaches and encourages and supervises others to look for them, not once a week or once a month, but every day.
4. He will be a salesman selling the idea and ideals of safety to every person in the company. He will influence each individual from the boss on down to accept his share of the responsibility for the prevention of accidents in your firm.
5. He will be an advertiser, an information source, an educator working to keep everyone informed concerning the progress that is being made and of the accident problems that need further concentration of effort.
6. He will be a secretary, but not the chairman, serving as a recording and reporting secretary for all of the safety meetings and activities in your company.
7. He will be a planner who studies trends, hazards and operations, designs and presents plans to your supervisory staff for their use in the prevention of accidents.

Trees Must be Set on Private Property

"We are proposing to the Committee charged with rewriting our by-laws that no more trees be set within street limits" writes H. W. Steele, Town Engineer, West Springfield, Mass. We think that all new streets should have trees set back 6 ft. or more on private property. This will assure that roots are more distant from the sewers and the street will appear wider.

Activated Sludge for London's Sewage

London, England, County Council reported in June that it expects to begin in 1954 the construction, at the outlets of the city's sewers into the Thames, of two activated sludge and sludge digestion plants, each with a capacity of 60 mgd. The estimated cost is £9,790,000. These, which they hope to complete in 1962, "should render the river inoffensive at all times."

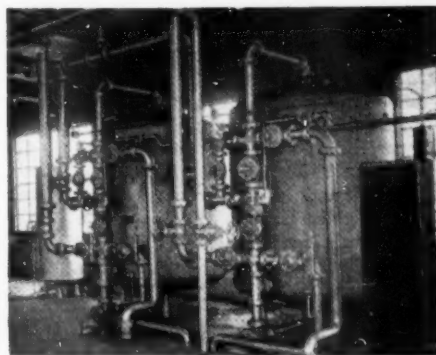
8. He will be at times a detective, to point out to you certain enforcement jobs you will have to do. Your safety man cannot be your policeman. He can only point out the policing work to be done.
9. He will be an idealist, a perfectionist, a fellow who gets in your hair. Why? Because unless he is imbued with a spirit of perfection he will not make you a good safety man. A man who is satisfied with the status quo, who is willing to let well enough alone, is not the man you are looking for to direct your safety program.
10. Actually, he will be a fellow who doesn't exist, because the best safety planning, presentation, direction, encouragement and selling is done so quietly, so smoothly, so indirectly, that the employees never quite realize they've been sold safety. They will think they developed it themselves.

Step #6. Sell yourself and keep yourself sold on the fundamental proven principles of a safety program.

1. You must, if your program is to be successful, have a sincere interest in the safety of your employees. That interest must start at the top and work down through the entire organization. The spirit in which you approach safety is of utmost importance.
2. Your safety program must be made a continuous working part of day to day operations. It can't be a hit or miss proposition. You can't have it on Fridays only. Safety must be made a chief concern of you, of all your superintendents, foremen and every employee you have on all operations at all times. If you, as top management, don't want to go all the way on making your program all-inclusive, full-time, you will not get results which will pay you dividends and keep you sold.
3. Your safety program must have the enthusiastic cooperation of all employees. Which way you approach them depends on your operations, but basically the approach must be made to the employee as an individual. It is the employee who works safely or who gets hurt, or killed, or damages equipment, or material. It is the individual employee who must know how to work safely and must recog-



EFFICIENT WATER SOFTENING



Lakeside uses different kinds of zeolites and accessories to meet your particular needs in a softener. Such care insures high capacity, minimal cost, long life and ease of operation. Bulletin 78 tells you a great deal about zeolite softening, including the capacities of the various zeolites,

how to determine the amount of zeolite required and how to compute the dimensions for any softening unit.

Sectional drawings show the details of construction of the softeners, and full data are presented on manual, semi-automatic and fully automatic control.

Send for Bulletin 78 now if you have a hard water problem.

LAKESIDE ENGINEERING CORP. 222 West Adams Street
Chicago 6, Ill.



"Doodling" A NEW LAB?

**you need this new
catalog and planning guide**

180 pages of valuable ideas, layouts, specifications...featuring the most modern laboratory furniture and equipment.

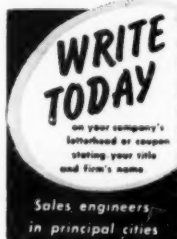
See how Metalab's exclusive sectional design gives you unlimited opportunity for "custom-building" your lab. Find out how you can satisfy your exact needs...without paying custom-made prices. It's the year's most valuable aid to laboratory planning. Don't miss it.



SECTIONAL LABORATORY FURNITURE AND EQUIPMENT *by*

METALAB *Equipment Corp.*

238 DUFFY AVE., HICKSVILLE, L. I., N. Y.



Metalab Equipment Corp., 238 Duffy Ave., Hicksville, L. I., N. Y.
Please send me without charge a copy of your new 180 page manual on laboratory planning.

☐ I am also interested in your free laboratory engineering and planning service.

Name _____ Title _____

Firm _____

Address _____

City _____ Zone _____ State _____

Get full details of this month's products... mail your Readers' Service card today.

nize the importance to himself of working safely. It is the employee who must cooperate, if the safety program is to succeed. You can, as management, require and demand, and get, a lot of things from your employees, but you do not get a productive safety program by requiring and demanding.

4. You must have an effective safety training program for your supervisors. This does not mean that you have to send them to school, for safety training does not necessarily require training in a formal

sense. It is inspiring them, encouraging them, making them want to do a good job and do it safely for their benefit. However, if your supervisors don't know how to do this and you can't or won't teach them how, you are spinning your wheels and wasting your time and money and kidding yourself into thinking you have a safety program.

These are the fundamentals of a safety program on a construction job and they are listed in the bracket of "NOW, WHAT DO I DO", so that in the very beginning

you will have a clear understanding of these fundamentals.

Step #7. Know the Truths of Accident Prevention in the Construction Industry.

1. Management has the best opportunity, the ability and the highest obligation, therefore it should assume the responsibility for the prevention of accidents to its employees.
2. The superintendent and foremen are the key men in the prevention of accidents in the construction industry, and must be convinced that the safe way is the profitable way to the completion of any job.
3. The direct costs of an injury accident usually measured by compensation liability claims and medical and hospital expenses are always accompanied by incidental and indirect costs which must be paid, one way or another. There is plenty of proof to show that these indirect costs average at least four times the direct costs.
4. The seriousness or degree of injury of an accident is largely luck. However, the occurrence or series of events leading to the accident is preventable in 98% of the cases.
5. The un-safe acts of employees are responsible for 90% of all construction accidents.
6. The reasons, the causes and the acts which create or cause or permit acts and occurrences which in turn cause accidents, provide the guide to the selection and establishment of corrective measures for the prevention of accidents.
7. The program for the prevention, or elimination, or reduction in degree of acts which cause accidents, prove that we actually do not prevent accidents as such. We prevent, prohibit, eliminate or block the acts or circumstances which in turn cause accidents.
8. An accident can happen only when it is accompanied by or preceded by one or both of two circumstances. (1) an un-safe act of an employee, and/or (2) existence of a physical or mechanical hazard.
9. The methods, the procedures and the tools used in preventing acts and conditions which cause accidents are parallel to those methods which are used to control cost, quality and quantity of employee moral.

Step #8. Other Things you may need to do.



MH
MECHANICAL JOINT

Cutting-in SLEEVE

Easy, Quick, Economical

Valve Set in Line

Joint Completed

This M & H mechanical joint Cutting-In Sleeve makes it easy to install a mechanical joint or a hub end gate valve or pipe fitting into an existing pipe line. Out of the pipe line cut only a length of pipe equal to the over-all length of the valve or fitting to be installed, plus 9 inches. The mechanical joint Cutting-In Sleeve is then telescoped over one of the cut ends, the valve inserted into position and the Sleeve pushed back to socket into the valve bell. The joint is then bolted up if it is mechanical joint valve, or poured and caked if hub end valve. For complete information, write or wire M & H Valve and Fittings Company, Anniston, Alabama.

M&H PRODUCTS

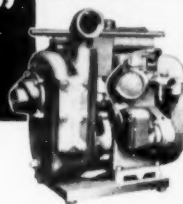
FOR WATER WORKS • FILTER PLANTS
INDUSTRY • SEWAGE DISPOSAL AND
FIRE PROTECTION

You may not need to do anything else. Or you may need to do a lot of other things. But listed here are some ideas and points against which you can measure the soundness and effectiveness of your safety program. These are additional points in brief on which many successful contractors and safety engineers agree are essential to a safety program.

1. Provide a simple, practical, enforceable safety clause in contracts and sub-contracts. In other words, spell it out, the way you want it done.
2. Along with every contract, enclose a letter on the safety policies and procedures to be followed by the craft, subcontractors and others having to do with production on the job.
3. Set up a budget item based on a percentage of labor dollars in the job estimate. Against this budget item charge all labor time for safety meetings, supervisory and management time, safety dinners, safety materials, etc. In this manner you will know exactly what safety costs you. As a guide, some companies, with successful safety programs, put from $\frac{1}{2}$ to $1\frac{1}{2}$ % of labor cost in this budget item.
4. Give safety top billing and top support from top management. Safety, like other points in management's views and attitudes, is reflected right on down through the organization.
5. After you give safety top billing, you can't sit back and assume that the men on the job, and your superintendent and foremen, will forever remember that you want safety with production. You must, like your superintendent and foremen, do the necessary follow-through. You must let everyone know by word and action that those people planning, directing, guiding and supervising the safety program will get unqualified support from top management.
6. Since you have the job of keeping yourself sold on the program, about the only way to do this is to keep a strict cost accounting of your safety program and periodically weigh it against potential and actual losses prevented. Be rough with the safety account in that you charge every item against it that rightfully belongs to it. Then be fair with the account and credit it with those savings and rebates due it.



Jaeger 60 lb. "Bantam" armored against wear



The only $1\frac{1}{2}$ " pump with a replaceable liner plate and stainless steel fitting at point of greatest wear. Engine runs at only 2500 to 3200 rpm instead of the 4200 rpm of pumps that have less capacity. These features mean thousands of extra hours of service. Sure primes automatically. Pumps 5100 gph. Aluminum model weighs 60 lbs. Powered by $1\frac{1}{2}$ hp. 4 cycle gas engine or $\frac{3}{4}$ or 1 hp. electric motor. See Bulletin LP 9.

Model 2 PAF delivers up to 9000 gph. Primes in a few seconds (less than 1 min. at 25 ft.). Aluminum; weighs 105 lbs., saltwater resistant. Replaceable liner plate and stainless steel fitting at point of greatest wear.

THE JAEGER MACHINE COMPANY

400 Dublin Avenue
Columbus 16, Ohio

COMPRESSORS • MIXERS • TRUCK MIXERS • PAVING MACHINERY

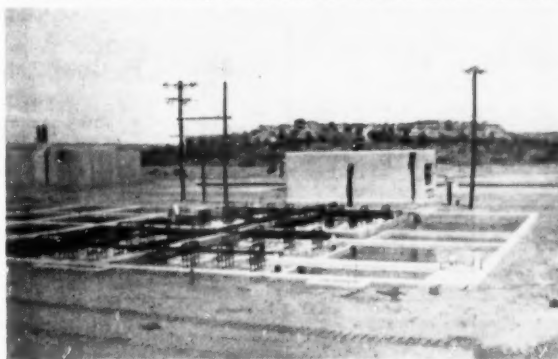
Since 1938 . . .

A PROVEN PROCESS

for economical, simple sewage treatment

Hays Submerged Contact Aeration

for SMALL CITIES, SUBDIVISIONS, INSTITUTIONS



City of Big Spring, Texas. Design: 20,000 population, 80 gallons per capita, 0.17 lb. B.O.D. with additional capacity for certain industrial wastes.

8 OUTSTANDING ADVANTAGES of which

- 1 is Exceptionally low cost. A Contact Aeration plant can usually be installed for substantially less initial investment than other processes.

The 7 other big advantages will be told in further ads—or
For fully descriptive literature Engineers are invited to address:

HAYS PROCESS COMPANY

P. O. Box 768, Waco, Texas

Need more facts about advertised products? Mail your Readers' Service card now.

DIRECTORY

Consulting Engineers

ALBRIGHT & FRIEL INC.

Consulting Engineers

Water, Sewage and Industrial Wastes Problems
Airfields, Refuse Incinerators, Dams
Power Plants, Flood Control
Industrial Buildings
City Planning, Reports, Appraisals and Rates
Laboratory

121 SOUTH BROAD ST. PHILADELPHIA 7

ALVORD, BURDICK & HOWSON

Engineers

Water Works, Water Purification,
Flood Relief, Sewerage, Sewage Disposal,
Drainage, Appraisals, Power Generation

20 No. Wacker Dr. Chicago 6, Ill.

MICHAEL BAKER, JR., INC.

THE Baker Engineers

Civil Engineers, Planners, and Surveyors
Airports, Highways, Sewage Disposal Systems,
Water Works Design and Operation—
City Planning—Municipal Engineering—
All types of Surveys

Home Office: Rochester, Pa.

Branch Offices:
Jackson, Miss. Harrisburg, Pa.

BANISTER ENGINEERING CO.

Consulting Engineers

POWER PLANTS, WATERWORKS, CITY
PLANNING, RURAL ELECTRIFICATION,
SANITATION, WASTE PROBLEMS,
AIRPORTS, STREET IMPROVEMENTS

1549 University Ave.
St. Paul 4, Minn.

BARKER & WHEELER

Engineers

Water Supply, Sewerage, Sewage Disposal,
Power, Public Utility and Industrial
Valuations and Rates

36 State Street, Albany 7, N. Y.
11 Park Place, New York City 7

HOWARD K. BELL

Consulting Engineers

G. S. Bell C. G. Gaither J. K. Latham
Water Works Sewerage Disposal
Water Purification Sewerage
Swimming Pools Refuse Disposal
Industrial Wastes

553 S. Limestone St. Lexington, Ky.

BLACK & VEATCH

Consulting Engineers

Water — Sewage — Electricity — Industry

Reports, Design, Supervision of Construction
Investigations, Valuations and Rates

4706 Broadway Kansas City 2, Missouri

CLINTON L. BOGERT ASSOCIATES

Consulting Engineers

Clinton L. Bogert Ivan L. Bogert
J. M. Greig Robert A. Litcoln
Donald M. Dimars Arthur P. Ackerman

Water and Sewage Works

Refuse Disposal Industrial Wastes
Drainage Flood Control

624 Madison Ave., New York 22, N. Y.

BOWE, ALBERTSON & ASSOCIATES

Engineers

Industrial Wastes—Refuse
Reports—Designs—Estimates
Disposal—Municipal Projects
Airfields—Industrial Buildings
Water and Sewage Works
Valuations—Laboratory Service

110 William St., New York 38, N. Y.

BROWN ENGINEERING CO.

Consulting Engineers

Waterworks, Sewage Disposal, Airports
Street Improvements, Power Plants
Electric Distribution, Rates

K. P. BUILDING DES MOINES, IOWA

BROWN & BLAUVELT

Consulting Engineers

Railroads Water Supply
Highways Sewage Disposal
Bridges Industrial Plants
Airports River Developments

Telephone: Lexington 2-7581

468 Fourth Ave., New York 16, N. Y.

BUCK, SEIFERT AND JOST

Consulting Engineers

(FORMERLY NICHOLAS S. HILL ASSOCIATES)

Water Supply Sewage Disposal
Hydraulic Developments
Reports, Investigations, Valuations
Rates, Design, Construction, Operation
Management, Chemical and
Biological Laboratories

112 East 19th St. New York City

BURGESS & NIPLE

Consulting Engineers

Established 1908

Water supply, treatment and distribution
Sewage and industrial wastes disposal
Investigations, reports, appraisals, rates
Airport, Municipal Engineering, Supervision

584 E. Broad Street Columbus 15, Ohio

RALPH H. BURKE, INC.

Consulting Engineers

Traffic Studies Underground Garages
Parking Structures Grade Separations
Expressways, Airports and Terminal Buildings
Shore Protection Municipal Engineering
Parks Field Houses Swimming Pools

20 North Wacker Drive, Chicago 6, Ill.

BURNS & McDONNELL

Consulting and Designing Engineers

Kansas City 2, Mo.

F. O. Box 7038



Cleveland 14, Ohio

1404 E. 9th St.

JAMES M. CAIRD

Assoc. Am. Soc. C. E.

Chemist and Bacteriologist

Water Analysis and Tests of Filter
Plants
Office and Laboratory

Cannon Bldg., Broadway & 2nd St.
Troy, N. Y.

CAMP, DRESSER & McKEE

Consulting Engineers

Water Works and Water Treatment
Sewerage and Sewage Treatment
Municipal and Industrial Wastes
Investigations and Reports
Design and Supervision
Research and Development
Flood Control

6 Beacon St.

Boston 8, Mass.

CAPITOL ENGINEERING CORP.

Engineers—Constructors Management

Water Works Sewage Systems
Design and Surveys Roads and Streets
Planning Airports
Bridges Dams

Executive Offices
DILLSBURG, PENNSYLVANIA

THE CHESTER ENGINEERS

Water Supply and Purification
Sewage and Industrial Waste Treatment
Power Plants—Incineration—Gas Systems
Valuations—Rates—Management
Laboratory—City Planning

210 E. Park Way, Pittsburgh 12, Penna.

CHAS. W. COLE & SON

Consulting Engineers

Sewerage, Sewage Treatment, Industrial
Wastes, Water Supply, Water Treatment
Airports, Industrial Buildings
Design and Supervision

Chas. W. Cole, Sr. Chas. W. Cole, Jr.
Ralph Bushee M. J. McErlain

220 W. LaSalle South Bend, Ind.

CONSOER, TOWNSEND & ASSOCIATES

Water Supply — Sewage — Flood Control &
Drainage — Bridges — Express Highways —
Paving — Power Plants — Appraisals — Reports
— Traffic Studies — Airports
Gas & Electric Transmission Lines

351 East Ohio Street
Chicago 11, Ill.

COTTON, PIERCE, STREANDER, INC.

Associated Engineering Consultants

132 Nassau Street, New York 7, N. Y.
1405 W. Erie Avenue, Phila. 40, Pa.
P. O. Box 198, Hyde Park 36, Mass.

55 Caroline Rd., Gowanda, N. Y.
Water Supply, Treatment, Distribution—Sewage,
Sewage Treatment, Refuse Disposal, Air Pollution,
Power Plants, Incinerator Plants, Reports,
Plans, Supervision—Laboratory Service.

DE LEUW, CATHER & COMPANY

Consulting Engineers

Public Transit, Traffic and Parking Problems
Railroads Grade Separations
Motor Thoroughfares Expressways
Subways Tunnels
Power Plants Municipal Works

150 North Wacker Drive, Chicago 6, Ill.
79 McAllister St., San Francisco 2, Calif.

GANNETT FLEMING CORDDRY & CARPENTER, Inc.

Engineers

Water Works, Sewage, Industrial Wastes &
Garbage Disposal
Roads, Airports, Bridges & Flood Control
Traffic and Parking, Appraisals, Investigations
& Reports

Pittsburgh, Pa. Philadelphia, Pa.
Daytona Beach, Fla. Pleasantville, N. J.
HARRISBURG, PENNA.

GILBERT ASSOCIATES, Inc.

Engineers and Consultants

Power Plant Engineering
Water Supply and Purification
Sewage and Industrial Waste Treatment
Chemical Laboratory Service

New York Reading, Pa. Philadelphia
Houston Washington

7. Blending safety into all parts of the job, like other money-saving elements, must originate at the top, because safety, like material conservation, starts at the top and works down.
8. You want a safety program. You know where to start. You know what to do. Yet the question remains, will safety in your company become a reality and a money maker, or will it just be "CONFIDENTIAL—FOR MANAGEMENT ONLY?"

• • •

Metropolitan Toronto

(Continued from page 79)

housing developments. Where the council takes over lands for these purposes, it will pay the municipality a sum equal to the taxes on that land. Eventually all phases of planning and development will be handled by the council, including strict control over land use.

Police and fire protection services were not placed under the metropolitan council at present because the cost of bringing suburban services up to the standard of the Toronto city proper would have been too high. Eventually they are planned to be part of the jurisdiction of the metropolitan council, but it is felt that the council will have enough on its hands with its present powers.

• • •

Restoring Pavements

(Continued from page 71)

lift (Base Course) 87,000 cubic yards; bituminous material for surface course 1,390 tons; bituminous material for prime coat 30,600 gallons; and bituminous concrete pavement 23,000 tons. The total bid price was \$407,822.00. This work is also under way, with completion expected at an early date.

The alignment and grades on this project meet acceptable design standards, and when the resurfacing is completed it will provide a 22-foot bituminous pavement with 7-foot shoulder on each side.

While asphaltic resurfacing cannot be expected to restore completely the usefulness and service life of the old concrete, the work already completed or under contract, along with additional work of this type proposed for future construction will provide many miles of comfortable driving. Much of it can be done without the necessity of a detour and with a minimum inconvenience to traffic.

GREELEY & HANSEN

Engineers

Water Supply, Water Purification
Sewerage, Sewage Treatment
Flood Control, Drainage, Refuse Disposal

220 S. State Street, Chicago 4

HOWARD R. GREEN CO.

Consulting Engineers

DESIGN AND SUPERVISION OF
MUNICIPAL DEVELOPMENTS
Water Works and Treatment—Sewers
and Sewage Disposal—Investigations
and Valuations

208-10 Bever Bldg., Cedar Rapids, Iowa
Established 1913

JOHN J. HARTE CO.

Engineers

Waterworks, Sewerage, Treatment
Plants, Gas Systems, Street and
Storm Drainage, Improvements
Public Buildings, Airports

ATLANTA, GEORGIA

HAVENS AND EMERSON

W. L. Havens C. A. Emerson
A. A. Burger F. C. Tolles F. W. Jones
W. L. Leach H. H. Moseley J. W. Avery

Consulting Engineers

Water, Sewerage, Garbage, Industrial Wastes,
Valuations—Laboratories

Leader Bldg. Woolworth Bldg.
Cleveland 14, O. New York 7, N.Y.

HAZEN AND SAWYER

Engineers

Richard Hazen Alfred W. Sawyer
Water Supply and Sewage Works
Drainage and Flood Control
Reports, Design, Supervision of
Construction and Operation
Appraisals and Rates

110 East 42nd Street New York 17, N.Y.

HILL & HILL

Engineers

Sewage and Waste Disposal,
Water Supply and Filtration,
Dams, Reservoirs, Tunnels,
Airport and Topographic Surveys

Home Office: 8 Gibson St., North East, Pa.

WILLIAM T. HOOPER, JR. CONSULTING ENGINEERS

Water Supply, Sewerage and Sewage
Treatment, Municipal, Industrial,
and Structural Design, Reports,
Supervision, and Laboratory Service

804 Belvidere Street Waukegan, Illinois

FOR RATES FOR THIS SPACE

Write

PUBLIC WORKS MAGAZINE

310 East 45th Street New York 17, N.Y.

JONES, HENRY & WILLIAMS

(Formerly Jones, Henry & Schoonmaker)

Consulting Sanitary Engineers

Water Works
Sewerage and Treatment
Waste Disposal

Security Bldg. Toledo 4, Ohio

FOR RATES FOR THIS SPACE

Write

PUBLIC WORKS MAGAZINE

310 East 45th Street New York 17, N.Y.

Engineering Office of

CLYDE C. KENNEDY

◆ Water Supply
◆ Sewage and Waste Treatment
◆ Sewage Reclamation

CHEMICAL and BIOLOGICAL LABORATORY
SAN FRANCISCO

MORRIS KNOWLES INC.

Engineers

Water Supply and Purification, Sewage
and Sewerage Disposal, Industrial Waste,
Valuations, Laboratory, City Planning

1312 Park Building, Pittsburgh 22, Pa.

HAROLD M. LEWIS

Consulting Engineer—City
Planner

Analyses of urban problems,
master plans, zoning, parking, airports,
subdivisions, redevelopment,
Reports—plans—ordinances

15 Park Row New York 38, N.Y.

WM. S. LOZIER CO.

Consulting Engineers

Sewerage, Sewage Disposal, Water
Supply, Water Purification, Refuse
Disposal

10 Gibbs Street Rochester 4, N.Y.

METCALF & EDDY

Engineers

Water, Sewage, Drainage, Refuse and
Industrial Wastes Problems
Airfields Valuations

Laboratory
Stotler Building
Boston 16

BOYD E. PHELPS, INC.

Architects-Engineers

Water Supply and Purification
Sewage and Industrial Waste Treatment
Municipal Buildings
Airfields, Power Plants
Reports & Investigations

Michigan City Indianapolis Indiana

PALMER AND BAKER, INC.

CONSULTING ENGINEERS — ARCHITECTS
NAVAL ARCHITECTS — MARINE ENGINEERS

Surveys-Reports-Design-Supervision-Consultation
Transportation and Traffic Problems
Tunnels-Bridges-Highways-Airports-Industrial Buildings
Waterfront and Harbor Structures, Graving and Floating Dry Docks
Vessels, Boats and Floating Equipment
Complete Soils, Materials and Chemical Laboratories

Mobile, Ala.

New Orleans, La.

Houston, Texas

Washington, D. C.

MALCOLM PIRNIE ENGINEERS

Civil & Sanitary Engineers

Malcolm Pirnie Ernest W. Whitlock
Robert D. Mitchell Carl A. Arenander
Malcolm Pirnie, Jr.
Investigations, Reports, Plans
Supervision of Construction and Operations
Appraisals and Rates

25 W 49th St. New York 18, N. Y.

THE PITOMETER COMPANY

Engineers

Water Waste Surveys
Trunk Main Surveys
Water Distribution Studies
Water Measurements and Tests
Water Wheels, Pumps, Meters

New York 50 Church St.

FOR RATES FOR THIS SPACE

Write

PUBLIC WORKS MAGAZINE

310 East 45th Street New York 17, N. Y.

PRELOAD ENGINEERS INC.

Founded—1934

Consultants in Prestressed Design

Designers of more than 800 pre-stressed concrete bridges, buildings, tanks and pipe lines erected in the United States since 1934.

955 North Monroe Street, Arlington, Va.

RUSSELL AND AXON

Consulting Engineers

Civil—Sanitary—Structural
Industrial—Electrical
Rate Investigations

408 Olive St., St. Louis 2, Mo.
Municipal Airport, Daytona Beach, Fla.

IRBY SEAY COMPANY

Water Engineers—Water Consultants

Water Supply Water Treatment
Water-use Survey Water Wastes

516 Goodwyn Inst. Bldg. Phone 8-2733

Memphis, Tennessee

MILES O. SHERRILL & ASSOC.

Consulting Engineers—Municipal & Industrial

Maria C. Welch 1412 Bardstown Rd.
Associate Engineer Louisville 4, Ky.

"The Sherrill Engineers"

Water Purification & Distribution—Sewerage & Sewage Disposal—Surveys & Highway Location—Dams, Reservoirs & Area Drainage—Valuations & Reports—Oil & Industrial Wastes—Garbage Disposal & Incineration—Streets & Storm Drainage
Swimming Pools A Specialty

FOR RATES FOR THIS SPACE

Write

PUBLIC WORKS MAGAZINE

310 East 45th Street New York 17, N. Y.

FOR RATES FOR THIS SPACE

Write

PUBLIC WORKS MAGAZINE

310 East 45th Street New York 17, N. Y.

SMITH & GILLESPIE

Municipal and Consulting Engineers

Water Supply, Water Purification
Sewerage, Sewage Disposal, Drainage
Refuse Disposal, Gas Systems, Power Plants
Airports

Jacksonville Florida

STANLEY ENGINEERING COMPANY

Consulting Engineers

Airports—Drainage
Electric Power Waterworks
Sewerage—Valuations—Rate Studies
Municipal Buildings

Hershey Building Muscatine, Ia

ALDEN E. STILSON & ASSOCIATES

Limited

Consulting Engineers

Water Supply, Sewerage, Waste Disposal,
Bridges—Highways—Industrial Buildings
Studies—Surveys—Reports

Surveys, Reports, Appraisals
209 So. High St. Columbus, Ohio**J. STEPHEN WATKINS**

J. S. Watkins G. R. Watkins

Consulting Engineers

Municipal and Industrial Engineering, Water
Supply and Purification, Sewerage and Sewage
Treatment, Highways and Structures, Reports,
Investigations and Rate Structures.

251 East High Street Lexington, Kentucky

Branch Office
901 Hoffman Building Louisville, Kentucky**WHITMAN, REQUARDT and Associates**

Engineers—Consultants

Civil—Sanitary—Structural

Mechanical—Electrical

Reports, Plans, Supervision, Appraisals

130 St. Paul St., Baltimore 2, Md.

NOW

is the time to send your reservation
in for space in this directory. Rates
will be sent on request.

Write

PUBLIC WORKS MAGAZINE

310 East 45th St.
New York 17, N. Y.

"Doc" Symons

(Continued from page 18)

girls of the "Ladies Auxiliary" of FSIWA are still not too happy about the word sewage in the organization's name,—*"Jo"* (that's Mrs. Ralph) Fuhrman of Washington, D. C., suggests the use of the word "Hydro-wastes".—Any comments?

Sign in hotel room in Miami—"Remember, if you plan to smoke in bed, please inform the desk where to send your remains and leave a list of your nearest relatives and your Last Will and Testament with the clerk."

★ ★ ★

Small World No. 22—You didn't know it, but W. H. (Pete) Wisely, FSIWA Exec. Secy., was quite a thespian in high school. At least, he once played "the man in the bowler hat" in the play of the same name by A. A. Milne.

Pete threw the audience, particularly the Principal, into a tizzy when he sat through the performance with a cigar in his mouth (he was 17 at the time). Both he and the drama teacher, Miss Inez Matthews, who was blameless, caught it after the show.—Many years later I met Miss Matthews, who was then Mrs. Guy Little, in Sullivan, Ill., where I spent a couple of years in the mid thirties.—Small World!

★ ★ ★

News Notes from Brushy Bend

The Eastern Section Pennsylvania Water Works Operator's Assn. held its fall meeting on Oct. 9, at the Allentown Water Plant, with dinner afterward at the Keystone Trail Inn, with a choice of veal cutlet or lobster tail. The Eastern Committee are Leon Duckworth (Lancaster), Archie (W & T) Andrews and P. P. (Parts Per Million) Merkel.

—A water works meeting was held in Avon, N. Y., on Oct. 14. "Stable Master" was Rely Clark, Sales Rep., Water Works Dept., Haverstick Co., Rochester, N. Y.

—The Westchester Water Works Conference held its autumn meeting at Bertrands Restaurant in Ossining, N. Y., "where the good water flows!" For \$3.00 the members got a country style roast beef dinner, with beer and gratuity thrown in.

—The Monmouth and Ocean Counties Sewage and Industrial Wastes Assn. held its annual meeting on Nov. 7. This was a testimonial dinner to "Bob" Shaw of the N. J. State Health Dept. New officers were elected. Wm. Stan Applegate is Secretary-Treasurer.

V. T. Y.—Doc Symons

ROBERT AND COMPANY ASSOCIATES*Architects and Engineers*

ATLANTA

WATER SUPPLY • SEWAGE DISPOSAL • INCINERATORS • POWER PLANTS

PUBLIC WORKS EQUIPMENT NEWS

Published Monthly

December, 1953

New Digestion Process To Reduce Cost of Many Waste Treatment Plants

CHICAGO, Ill.—A new process which completes biological sludge digestion in one-quarter of digester volume generally required, has been announced by Professor Philip F. Morgan, Professor of Civil Engineering, University of Iowa. This means that the capital expenditures for the digestion stage in sewage and industrial waste treatment plants may be drastically cut. Because of rapid population increases since the war, many existing plants have seriously overloaded digesters. The use of the process will make existing tank capacities sufficient to carry the increased loads imposed on many sewage plants.

Results of Study

After several years study, both on laboratory and pilot plant scale, Professor Morgan has concluded that it is possible to complete the anaerobic decomposition of sewage solids in approximately one-third to one-fourth the time currently considered necessary. Operation over a period of four years has indicated that loading ratings of 0.345 lb. of volatile solids per cubic foot of digester volume per day can be successfully digested. This contrasts with normal present-day loadings of 0.05 lb. of volatile sewage solids per cubic foot of digester volume. The sludge produced is the equal in every respect to sludge produced by currently practiced digester operation methods. These findings have been verified in full scale plant operation at Columbus, Ohio.

Known as Catalytic Reduction Process, this is being offered for consideration to consulting engineers and municipalities through the Catalytic Reduction Co., Inc., a subsidiary of the Chicago Pump Company. For more details, circle No. 12-1 on Readers' Service Card.

Johns-Manville's Ring-Tite Coupling Automatically Centers Itself, Aligns and Provides for Expansion

NEW YORK, N. Y.—Ring-Tite is the name of a new coupling which Johns-Manville has developed for use with Transite pressure pipe. It can cut down expected installation time radically since the Ring-Tite coupling automatically centers, aligns and provides for expansion.



Elements of coupling slide together so this simple puller does entire job

Furthermore, it can be quickly assembled even under adverse trench conditions. Up to now the Simplex coupling has been the standard recommendation for underground pressure lines of asbestos-cement pipe. It consists of a sleeve and two rubber rings. The new Ring-Tite coupling is made up of the same elements but the sleeve of Transite and the ends of the Transite pipe are of a different design. The sleeve has two grooves cut circumferentially into the inner wall. These grooves locate the rings accurately and firmly hold them in position.

To go with this sleeve, the ends of the pipe are specially machined to provide an entering taper back of which is a two-step machined area. The taper makes it easier to insert the pipe. The shoulder between the two steps provides a stop which halts movement as the pipe, rubber rings and Transite sleeve slide together.

A recently completed job using Ring-Tite couplings and pipe is at Mattapoisett, Massachusetts. The contractor was the A. E. Bragger Construction Co. of Greenwood, Rhode Island. The belling ahead method was used since fifty per cent of the assembly could be done before lowering into the trench. In this way the excavator could be opening the trench while the top crew was doing half of the assembly. Also it made it possible to get in and get out quickly. This was important since a large part of the line was through wet, boggy ground.

The total length of the line was 3,300 ft. The contractor had figured on laying 400 ft. per day based on expected conditions. However, the Ring-Tite assembly was so speedy and it was possible to get through bad spots so easily that the laying rate actually came to 700 ft. per day. Ask for complete information.

Circle No. 12-2 on Readers' Service Card

Power-Pack Announces New Hopper Conveyor

CLEVELAND, Ohio. — Power-Pack Conveyor Co. has announced a new hopper conveyor for filling trenches, curbing and ditches and backfilling pipelines. An engine of 8 hp drives the 14-inch wide conveyor belt.



Hopper-conveyor that fills trenches, curbing, ditches; backfills pipelines

• USED •
EQUIPMENT
 and
CLASSIFIED ADVERTISING

**CIVIL ENGINEER
 WANTED**

City of Bryan, Williams County, Ohio, population 7000, is in need of a city engineer. Salary range \$5000.00 to \$6500.00 per year. Reply giving experience record, personal history and salary wanted. Write to

Robert Hamet,

city clerk, City Hall, Bryan, Ohio

**ENGINEERS AND
 SUPERINTENDENTS
 WANTED**

City Manager L. M. Lovejoy of Woodstock Ill., desires applications from: City Engineer, civil, mechanical or electrical, with street experience, \$480 to \$575; also a young engineer with less qualifications; also superintendent of streets, water and sewers, \$480 to \$575. Apply direct.

**TRAFFIC OPERATIONS
 ENGINEER**

Graduation from an accredited four year college. Major course work in engineering, preferably electrical or civil. Experience as traffic engineer desirable. Salary \$5044-\$5876 per year. Complete details by writing to

DIRECTOR OF PERSONNEL
 MUNICIPAL BUILDING, HARTFORD, CONN.

ENGINEER-WRITER AVAILABLE

Young man, veteran, civil engineer background, desires position, preferably in New York area on editorial staff of house organ or technical publication

ROBERT SILVERSTONE,

28 West 12th St., New York 11, N. Y.,
 or telephone ORgon 5-8474.

Controls are located at the operator's platform for easy adjustment of belt speed, amount of material fed through the bottom openings of the hopper, and placement of the fill material. Maximum capacity is 3 tons per minute and maximum belt speed is 500 ft. per minute.

The conveyor is towed by a truck which dumps its load into the hopper feeding the belt. An adjustable deflector permits the operator to place the material without waste or spillage. Speed of the towing truck and conveyor belt, and amount of material being carried by the belt con-

trols the rate of fill delivered. Any fill material from sand, cinders, and crushed stone to heavy clay can be handled.

Two of the wheels are mounted on swivel axles so the complete unit meets highway limitations and can be towed from job to job by car or truck without the need of a trailer. Net weight is 2100 pounds.

Bulletin C-10, price list and information on distributor franchises is available from Power-Pack Conveyor Co., 13910 Aspinwall Ave., Cleveland 10, Ohio, or use our Readers' Service Card.

Circle No. 12-3 on Readers' Service Card

Complete New Line of "Quick-Way" Truck Shovels

DENVER, Colo.—Luke E. Smith, President of the "QUICK-WAY" Truck Shovel Company, announces the introduction of a complete new line of "QUICK-WAY" Truck Shovels. Smith points out that "QUICK-WAY" offers a complete



New "Quick-Way" ½ yd., 10-ton crane offers many new engineering features

line of small capacity, truck mounted equipment with capacities for the new L-2 of ½ yard, 10 ton crane; E-2, 4 10 yard, 7½ ton crane; S-2, 1 3 yard 5 ton crane; and J-2, ¼ yard, 3½ ton crane.

"QUICK-WAY" for many years has furnished special money-making

attachments. The new models stress convertibility with five booms—crane, shovel, trench hoe, front dump shovel, and scoop. With these booms the "QUICK-WAY" special attachments, such as the new Hammer Drive clam, dragline, clamshell, magnet, pile driver, hay fork, log grapple, back filler blade, telescoping boom and skull cracker, permit owners to handle numerous jobs, both large and small.

New features of the Model L-2 and E-2 include an all-steel, full vision cab with safety glass with 360° vision, more room, greater comfort and controlled ventilation. New clutches are of "roll in", self-energizing, reversible shoe type. All five clutches are interchangeable. The new design eliminates time-consuming adjustments and "down" time. Use the Readers' Service Card for full information.

Circle No. 12-4 on Readers' Service Card

**Bros Sno-Flyer Rotary Plow
 Removes 3-4 Tons a Minute**

MINNEAPOLIS, Minn.—The new Series "A" Sno-Flyer Rotary Snow Plow, manufactured by Bros, is the newest in Bros' line of snow removal equipment. Snow removal capacity is 3 to 4 tons per minute in average snow conditions. The plow is particularly well suited for snow removal work around plant yards, storage areas, sidewalks, airports, streets, side roads, parking lots and railroads. Any job too big for sidewalk units and too small for the big truck units is just right for the new Bros Rotary.

Bucket tilting device provides positive operating control on plow and engine at different elevations. In this way, the unit can be raised

to the top of high drifts, to chew them down, layer by layer.

A special loading chute allows truck loading on either side of plow. Its rotating feature permits "spot" casting of snow in confined areas. Casting chute can be rotated through arc of 180 degrees. A special capping



Rugged Sno-Flyer mounts on hydraulic wheel-type, front-end tractor loader

device can be added to control height of ejected snow stream.

This unit available in three models; plowing widths of 78 ins., or 66 ins., and 54 ins. New illustrated brochure from Wm. Bros Boiler and Mfg. Company, 1057 10th Ave. S.E., Minneapolis 14, Minn., or use our card.

Circle No. 12-5 on Readers' Service Card

McConaughay Announces New HTD-500 Multi-Pug Asphalt Mixer

LAFAYETTE, Ind.—The HTD-500 Multi-Pug asphalt mixer is a recent addition to the line of portable asphalt mixers being produced by



Portable multi-pug mixer produces 15 tons of stock pile mixtures an hour

K. E. McConaughay. It is especially suited to hot or cold patching in any season, under wet or dry conditions and handles mixtures of asphaltic concrete, sheet asphalt, sand asphalt, or mastic asphalt at high production rates. Stock pile mixtures are produced up to 15 tons per hour; cold asphaltic mixtures up to 30 tons per hour; and hot asphaltic mixtures up to 10 tons per hour. Wet aggregates are dried quickly and thoroughly. Send for more details.

Circle No. 12-6 on Readers' Service Card

Portable Self-Contained Power Plant to Generate Electricity

A 1,000-KW portable heavy-duty diesel generator set has just been announced by Enterprise Engine & Machinery Co., 18th & Florida Sts., San Francisco 10, Calif. This unit is wholly self-contained on a skid mount; fuel tanks, cooling radiator, control panel and all necessary gear being mounted on a common skid. It can be used on all types of work, including dam construction,

air field clearing, for distress areas, etc. The large unit is approximately 35 feet in overall length; smaller units in 100 to 500-KW range are approx. 10 feet. Weight range is from 5½ to 22½ tons. The unit can be shipped or transported ready for use on arrival anywhere.

Circle No. 12-7 on Readers' Service Card

Thew Unveils New Lorain Moto-Cranes

LORAIN, O.—The Thew Shovel Co. has announced two additions to its line of Lorain Moto-Cranes. They are model MC-254W in the "TL" Series, with a lifting capacity of 17½ tons, and model MC-424 whose lifting capacity is 22½ tons. Model MC-254W is a 3-axle Moto-Crane available as a ¾-yd. shovel, crane, dragline, clamshell, hoe or 1¼-cu. yd. scoop shovel. Over-all width is 106 inches, giving additional lifting capacity "on rubber," without setting outriggers, while maximum boom length with tip extension is 95 ft. It is equipped with 8 forward speeds, 2 reverse speeds and air brakes. It can travel up to 37 mph. It may be had with diesel or gasoline power for turntable and carrier, with front driving axle, third drum and other accessories.

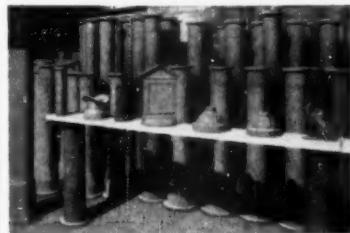


Three-axle Moto-Crane lifts 17½ tons

The 22½ ton model MC-424 is a two-engine machine with a gasoline-powered turntable or superstructure mounted on a 3-axle carrier, with drive on the two rear axles, powered by a separate gasoline engine at 10 forward and 2 reverse speeds. The carrier has an over-all width of 96 inches and is equipped with air brakes. The maximum boom length with tip extension is 125 ft. and it may be equipped with diesel power for turntable, third drum, power load lowering, front wheel brakes and many other accessories. The MC-424 is convertible to shovel, crane, clamshell, dragline or hoe booms. Mail card for complete information.

Circle No. 12-8 on Readers' Service Card

Yes . . .



Buffalo Pipe can Supply any Municipal Casting!

Whether you're in the market for valve boxes, meter boxes, manholes — or special hydrant and fire-box parts such as you see here — you'll find Buffalo Pipe's huge production will give you prompt shipment at reasonable prices. Ask us for Bulletin M-11.

For special quotations, wire, write or phone Dep't H.

BUFFALO PIPE and FOUNDRY CORP.
Box 55, Station 8 Delaware 4764 Buffalo, N. Y.

FOR REPAIRING BELL AND SPIGOT JOINT LEAKS...



SKINNER-SEAL
Bell Joint Clamp for stopping bell and spigot joint leaks under pressure. Gasket is completely sealed: at bell face by Monel Metal Seal band — at spigot by hard vulcanized gasket tip. 2" to 42".

AND BROKEN MAINS


SKINNER-SEAL
Split Coupling Clamp. One man can install in 5 to 15 minutes. Gasket sealed by Monel band. Tested to 800 lbs. line pressure. A lasting repair. 2" to 24" incl.



M. B. SKINNER CO.
SOUTH BEND 21, INDIANA, U.S.A.

*the search for
PURE WATER*

6th CENTURY B. C.



Fresh water in large silver flagons accompanied Persia's Cyrus the Great when he made war on his enemies. Drawn by mule cart, the water was boiled to make it "keep".

For excellence in MODERN water treatment equipment—gravity and pressure filters—recirculation apparatus...

MECHANICAL EQUIPMENT
BY
ROBERTS FILTER MFG. CO.
DARBY, PENNA.

ROBERTS FILTER MFG. CO.
640 Columbia Ave.
Darby, Pa.

living in a CAPITAL way



Capitalize on the finest location in Washington by making the Raleigh your headquarters for business and pleasure. Entertain your associates—Pal Mall Restaurant, Raleigh Cocktail Lounge, Old English Tavern. Be near to Government Buildings, downtown stores, theatres. A prestige address with moderate rates.

★ **SPECIAL COURTESIES
TO HONEYMOONERS**
Write C. C. Schifferer, President

HOTEL RALEIGH
WASHINGTON 4, D. C.

On Famous Pennsylvania
Ave. at 12th Street N.W.

Badger Simplifies Truck-Mounted Hopto Trencher

WINONA, Minn.—Badger Machine Company of Winona, Minnesota, announces many important new features for their new, redesigned truck-mounted Hopto trencher, which is completely hydraulic in operation, without cables, sheaves, chains and sprockets.

The Hopto may be powered by water or air-cooled power units or driven by the power take-off of the



Hydraulic Hopto digger works without cables, sheaves, chains and sprockets

truck. Greater digging depth of 11 feet has also been built into this model. Fast cycling and a choice of bucket and back hoe widths from 8 to 38 inches adapt it to a wide variety of applications. Write today for more facts.

Circle No. 12-9 on Readers' Service Card

A snow removal bucket is available for the Gradall, product of Warner & Swasey Co., Cleveland, O., which is designed especially for ice and snow removal work in cities. Attached to the end of the Gradall 24-ft. telescoping boom, it can work in tight places and dispose of snow within a 24-ft. radius.

A one-man type crane carrier, developed by Cook Bros. Equipment Co., Los Angeles, Calif., can be installed on all makes of 20 to 25-ton cranes, either as original equipment or for used crawler or truck types. It has its own 100 hp engine and is completely controlled from the operator's position in the crane cab. Excellent for materials handling, pipe laying, and similar work.

Performance of the Hough Model H. M. "Payloader" has been considerably improved by the addition of a hydraulic torque converter according to officials of the Frank G. Hough Co., 930 Seventh St., Libertyville, Ill. This multiplies the torque output of the engine in direct proportion to the load and greatly reduces the amount of gear-shifting needed.

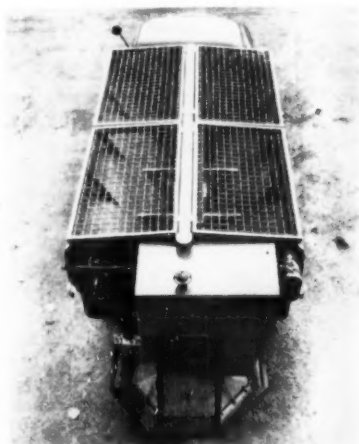
To prevent obsolescence of 6-volt mobile two-way radio units by the trend toward 12-volt automotive electrical systems, Motorola Inc., 4545 W. Augusta Blvd., Chicago, Ill., has designed two small 12-volt to 6-volt converter units. One converter is capable of supplying from 10 to 50 amperes, and the other from 10 to 30 amperes.

For increasing tractive power of wheel tractors Baraboo Manufacturing Corporation, Baraboo, Wis., has introduced metal traction lugs which are attached permanently to the wheel and can be made active or inactive quickly. Fit all wheel tractors with 28 or 38-inch tires.

Automatic valve for water treatment. A new 2-inch multi-port valve uses an electrical timer for automatic regeneration cycle control of commercial and industrial water softener, filter, and ion-exchanger systems. It is made by Automatic Pump & Softener Corp., Rockford, Ill.

A hydraulic attachment for tractors which can push, load, stack and lift 3,000 pounds up to 27 feet in the air has been developed recently by the American Road Equipment Company, 4302 No. 28th St., Omaha, Nebr. Attachments include dozer blade, platform, and V snow plow.

For salt, sand and cinder spreading. Highway Equipment Co., Cedar Rapids, Iowa, announced at the recent APWA Congress, a 1954 model fully equipped motor driven Model E Hi-Way spreader. Featuring one-man operation, it can spread sand,

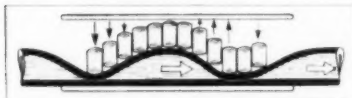


Self-contained spreader for aggregate materials has one-man operation

aggregates, calcium chloride, cinders, rock salt and pea gravel. It is completely self-contained and can be mounted or dismounted from a truck in one to two hours

Gas fired salamanders are now being manufactured in two models by Insto-Gas Corp., 1977 East Woodbridge, Detroit 7, Mich. One unit attaches directly to the top of an Insto-Gas cylinder; the other is connected to the cylinder by means of a hose. While both units are portable, the floor-type, when connected by various lengths of hose, can be used over a wide area without moving the cylinder. Because they produce no monoxide fumes, they may be used inside buildings to provide heat both for the work being done and for workmen's comfort.

A larger Sigmamotor pump is announced by Sigmamotor Inc., 544 N. Main St., Middleport, N. Y. Material is pumped through flexible tubing by the action of a series of chrome plated steel "fingers" exerting pressure on the flexible tubing.



Like milking a cow? Steel fingers squeeze flexible tube to pump liquid

It will pump liquids, gases or solids in solution. Handles from 45 to 250 gallons per hour at 500 rpm. Material is pumped from one receptacle to another by placing a connecting tube in the pump.

The Galion Iron Works & Mfg. Co., Galion, Ohio, has now available an economy-size Model 503 tandem drive motor grader with a hydraulic-powered circle. This circle is actuated by a heavy-duty hydraulic motor, the connection from which is by means of an enclosed worm reduction gear, and a spur pinion gear which meshes with the teeth on the circle. Attachments include hydraulically-operated rear end loader; scarifier; leaning front wheels; "V" snow plow; reversible straight blade bulldozer; windrow eliminator; hydraulically operated shiftable moldboard; and a "stand-up" height, fully enclosed cab made of steel and rubber-mounted safety glass. Large front tires, same size as used on rear wheels, are also available.

Polyphase a-c motors, offering better protection, more efficiency, and quieter operation have been announced by General Electric Co., Schenectady 5, N. Y. With an average size reduction of 50 percent by volume and averaging 22 percent

less weight per horsepower, the "55" line retains rigid cast-iron construction and incorporates a new insulation system, bearing assembly, and ventilation plan. Other advantages include a new polyester film many times as strong as previously used materials; and a new bearing assembly which is tightly sealed and lubricated by a long-life grease.

• • •

Dr. Karl Imhoff Receives Award

In special recognition of his services in the field of public hygiene, the President of the German Federal Republic has awarded the famous German engineer, Dr. Karl Imhoff, the Republic's Great Cross for Distinguished Services. This is the highest decoration given to engineers and scientists who have rendered service in this field of endeavor. The award was made at Essen last May at a special joint meeting of German engineers and federal officials. Dr. Imhoff, now 77 years old, has been the recipient, also, of honorary degrees from many colleges and institutes.

ASSOCIATIONS

The 25th annual meeting of the Southeastern Section, AWWA, will be held at the Poinsett Hotel, Greenville, S. C., March 29-31. N. M. deJarnette, State Department of Health, Atlanta, Ga., is Secretary.

The 3rd Southern Municipal and Industrial Waste Conference will be held at North Carolina State College, Raleigh, March 18 and 19. Further information is available from Mrs. H. F. Oehler, Jr., School of Engineering.

Engineer-Writer Available

Ambitious young vet, married, seeks position on a house organ or technical magazine in New York City area. College graduate; background in civil engineering and writing. Robert Silverstone, 28 West 12th St., New York 11, N. Y.

Teacher Wanted—Municipal Engineering and Public Works Administration

An Associate Professor is needed by the University of California. Must have at least master's degree and city engineering or similar municipal background with interest in research and development. Salary about \$6600 for nine months. Write H. B. Gotaas, Dept. of Engrg., U. of Cal., Berkeley 4, California.



Portable Hot Asphalt Plant Single Unit Heats & Mixes

Tow your PATCHMOBILE MODEL PM-215 to the job . . . and have all the equipment you need for hot asphalt patches! Features rotary dryer, asphalt tank, pugmill, power asphalt pump, spray attachment, volumetric asphalt measuring device and fuel-heating compartment . . . all in one unit. With Patchmobile PM-215 there's no manual handling of aggregate and asphalt from charging hopper to discharge chute.



Truck Tailgate Asphalt Mixer Compact Pugmill and Heater

Use HEAT-A-MIX to make cold stock-pile material as workable as fresh hot-plant mix! This compact, high-capacity pugmill and material heater has its own gasoline engine and propane heating system. Heat-A-Mix mounts quickly and easily by interchanging with truck tailgate.

Get Complete Information



Clip Coupon
For Catalogs



Name _____

Address _____

State _____

WYLIE MANUFACTURING CO., INC.
Box 7086 Zone 12, Okla. City

Tough and Strong LASTS EXTRA LONG



KONIK metal beats the rigors of a tough culvert life—it resists rust and fights element corrosion. The Continental open hearth steel plus copper, nickel and chromium does it. These sheets are made especially for culvert use because they stand more rough abuse. Continental Steel Corporation, Kokomo, Indiana.

**ASK TO SEE THE KONIK
CULVERT METAL WARRANTY**
Continental culvert distributors are glad to show the KONIK warranty... and the certified analysis that assures the longer culvert life of KONIK metal.



MUNICIPAL SUPPLIES



WRITE
TODAY
FOR
100
PAGE
CATALOG

W. S. DARLEY & CO., Chicago 12

STREET, SEWER AND WATER CASTINGS



Various Styles, Sizes
and Weights
Manhole Covers and Stems
Adjustable Curb Inlets
Water Meter Covers
Cistern and Coal
Hole Covers

Gutter Crossing Plates
Valve and Lamphole Covers

Write for Catalog and Prices
SOUTH BEND FOUNDRY CO.
Gray Iron and Semi-Steel Castings
SOUTH BEND 23, INDIANA

BUY

XMAS

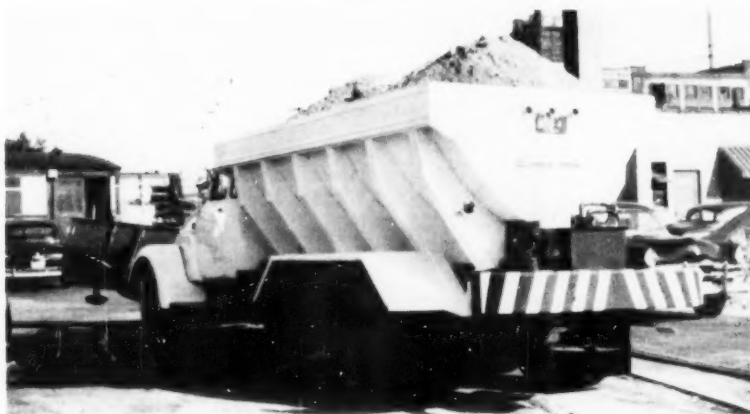
SEALS

INDEX OF ADVERTISEMENTS

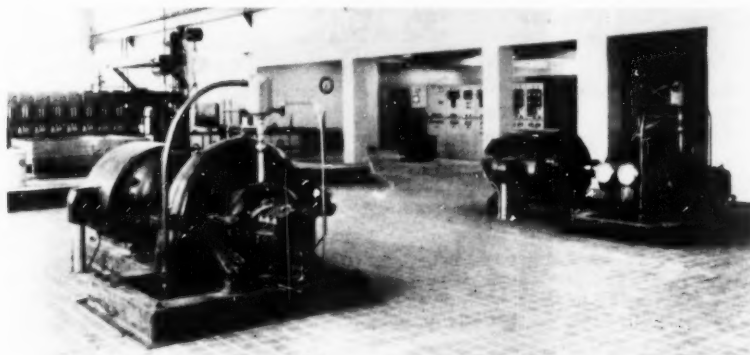
Aerol Products Co., Inc.	104	Hough Co., Frank G.	13
Air Placement Equipment Co.	41	Hunt, Rodney Machine Co.	43
Alabama Pipe Co.	40	Hydraulic Development Corp.	18
Albright & Friel, Inc.	124		
Alvard, Burdick & Howson	124	Industrial Materials Co.	16 & 17
American Concrete Pressure Pipe Assn.	35	International Salt Co., Inc.	52
American Playground Device Co.	92	Irving Subway Grating Co., Inc.	94
Am. Road Builders Assoc.	54		
Aqua Survey & Instrument Co.	133	Jaeger Machine Co.	123
Armco Drainage & Metal Prod.	93	Jeffrey Mfg. Co.	109
ARPS Corp.	34	Jones, Henry & Williams	125
Atlas Mineral Products Co.	108		
Ayer-McCord Clay Co., Inc.	16 & 17		
		Kennedy, Clyde C.	125
Baker, Jr., Michael, Inc.	124	Knowles, Inc., Morris	125
Bannister Engineering Co.	124	Koehring Co.	44
Barber-Greene Co.	37	Koppers Co., Inc.	58
Barker & Wheeler	124		
Baughmen Mfg. Co., Inc.	59	Lakeside Engineering Corp.	121
Bell, Howard K.	124	Leopold, F. B.	134
Black & Veatch	124	Lewis, Harold M.	125
Blackburn-Smith Mfg. Co.	113	Link-Belt Co.	11
Blackston Chemical Co.	12	Lock Joint Pipe Co.	135
Bogert Assoc., Clinton L.	124	Lozier Co., Wm. S.	125
Bowe, Albertson Assoc.	124		
Bowerton Shale Co.	16 & 17	Mathieson Chemical Corp.	56
Brown & Blauvelt	124	McConaughay, K. E.	103
Brown Engineering Co.	124	McWane Cast Iron Pipe Co.	34
Buck, Seifert & Jost	124	Metallab Equipment Corp.	121
Bucyrus-Erie Co.	33	Metcalf & Eddy	125
Buffalo Pipe & Foundry Corp.	129	M & H Valve & Fittings Co.	122
Buffalo-Springfield-Roller Co.	15	Morse Bros. Machinery	110
Buffalo Steel Div.	29	Motorola Communications & Electronics, Inc.	49
H. K. Porter Co., Inc.	111	Mueller Co.	21
Builders Providence, Inc.	124		
Burgess & Mipple	124	Natco Corp.	16 & 17
Burke, Inc., Ralph H.	124	National Clay Pipe Mfrs., Inc.	23
Burns & McDannell Engr. Co.	124	National Surety Corp.	36
Butler Mfg. Co.	31	Natural Rubber Bureau	6
B/W Controller Corp.	42	Norton Company	51
Caird, James M.	124	Oshkosh Motor Trucks, Inc.	50
Camp, Dresser & McKee	124		
Capital Engineering Corp.	124	Pacific Flush Tank Co.	19
Carlson Products Corp.	30	Pacific States Cast Iron Pipe Co.	46
Cast Iron Pipe Research Assn.	8 & 9	Palmer & Baker, Inc.	125
Caterpillar Tractor Co.	4, 60, 101	Phelps, Inc., Boyd E.	125
Centriline Corp.	48	Pirnie Engineers, Malcolm	126
Champion Corp.	40	Pittometer Company	126
Chester Engineers	124	Pittsburgh-Das Moines Steel Co.	95
Chicago Pump Co.	3	Pollard Co., Inc., Jos. G.	117, 131
Clark-Wilcox Co.	44	Pomona Terra-Cotta Co.	16 & 17
Classified Ads	128	Preload Engineers Inc.	126
Climax Engine & Pump Mfg. Co.	117	Price Brothers	25
Clow & Sons, James B.	114	Proportioners Inc.	45
Cole & Sons, Chas. W.	124		
Consoer, Townsend & Assoc.	124	Quinn Wire & Iron Works	46
Continental Steel Corp.	132		
Cotton, Pierce, Sreander, Inc.	124	Reliance Chemicals Corp.	113
		Ridge Tool Co.	24
Darley & Co., W. S.	132	Robert & Co., Associates	126
DeLauw, Cather & Co.	124	Roberts Filter Mfg. Co.	113 & 130
Dempster Brothers, Inc.	27	Roots-Connersville Blower Corp.	26
Dickey Clay Mfg. Co., W. S.	16 & 17	Russell & Axon	126
Dorr Co.	39		
Dresser Industries, Inc.		Seay Co., Irby	126
(See Dresser Mfg. Div.)		Sherrill, Miles O.	126
Dresser Mfg. Div.	47	Skinner Co., M. B.	129
(See Roots-Connersville Blower Corp.)		Smith & Gillespie	126
		South Bend Foundry Co.	132
Fairbanks-Morse & Co.	53	Stanley Engineering Co.	126
Federal Enterprises, Inc.	57	Stilson Assoc., Alden E.	126
Fisher Research Lab., Inc.	46	Street & Highway Manual	28
Flexible Sales Corp.	38		
Foote Const. Equip. Div.	55	Tarrant Mfg. Co.	102
Frink Snow Plows, Inc.	41	Texas Vitified Pipe Co.	16 & 17
		Trickling Filter Floor Institute	16 & 17
Gannett, Fleming, Corddry &			
Carpenter, Inc.	124	Union Metal Mfg. Co.	10
Gilbert Associates, Inc.	124	U. S. Pipe & Foundry Co.	99
Greeley & Hanson	125		
Green Co., Howard R.	125	Wallace & Tiernan Co., Inc.	Back Cover
Greenlee Bros. & Co.	102	Watkins, J. Stephen	126
Grote Mfg. Co.	42	White Co., David	14
		Whitman, Requaert & Assoc.	126
Hamilton Kent Mfg. Co.	46	Wolverine Tube Division	
Harte Co., John J.	125	Calumet & Hecla, Inc.	2
Havens & Emerson	125	Woud Co., R. D.	96
Hays Process Co.	123	Wylie Mfg. Co., Inc.	137
Hazen & Sawyer	125		
Healy-Ruff Co.	133		
Heitzel Steel Form & Iron Co.	20		
Highway Equipment Co.	97		
Hill & Hill	125		
Homestead Valve Mfg. Co.	22		
Hooper, Jr., William T.	125		
Hotel Raleigh	130		

WORTH SEEING

To eliminate ice and snow hazards for motorists and help solve cold weather traffic congestion, Boston's \$25-million Aerial Highway will have the largest snow melting installation ever. Over 200 tons of A. M. Byers wrought iron pipe grid the concrete paving. Fay, Spofford & Thorndyke, engineers; and Commonwealth of Massachusetts Bridge Department, designers.



"Snow King" is the brand name of this big combination snow plow and salt spreader being demonstrated for the Chicago Transit Authority. Snow King Inc., makers, 540 North Michigan Ave., Chicago, state the King can be readily removed from the truck chassis permitting it to be used for other purposes.



Last June we ran a story on the all-electric Thomas A. Allen pumping station of the Memphis Water Department. Now we can show two of the DeLaval pumps mentioned that move 30 mgd of water without aid of elevated pressure. Two more are on order. Switch gear in background is of G. E. manufacture.

**FOR QUICKER, SURER
LOCATIONS EVERYTIME**

THE *New* AQUA VALVE BOX LOCATOR

New engineering design, perfected after two years of research and now built into the AQUA at no additional cost to you MEANS ABSOLUTE MINIMUM OF NEEDLE-SPINNING ACTION!

YOUR NAME IN GOLD FREE!



It's Magic! The new Aqua Extra Conductor development... an exclusive in the location instrument field!

\$29.50
F.O.B. CINCINNATI

SEND NO MONEY! Try AQUA for 15 days — you be the judge.

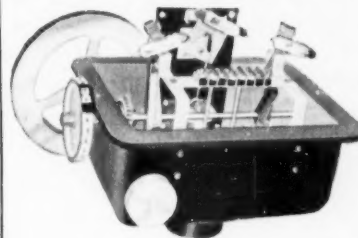
"... greatly improved... no needle nervousness... pinpoint accuracy. The new Aqua has our unqualified approval!"

W. F. Becker, Chief Inspector
The Ohio Fuel Gas Co. Columbus, Ohio

Literature on request — address Dept. PW

AQUA SURVEY & INSTRUMENT CO.
2218 LESLIE AVE. CINCINNATI 12, OHIO

ROTO-TROL



RF-2

with **ALTO-TROL**

Puts that second pump to work.

A 2-pump RF-2 ROTO-TROL with a built-in ALTO-TROL will operate each pump on alternate starting cycles, assuring equal use and wear of both pumps. Operates both pumps when required.

Depth Indicator optional — extra.

Write for full data.

Water Level Controls Division

HEALY-RUFF Company

791 Hampden Ave., St. Paul 4, Minn.

IT PAYS TO *Specify*
LEOPOLD
Glazed Tile
FILTER BOTTOMS



Here's why—

Permanent • No corrosion or tuberculation • Equal distribution • Low loss of head • Requires only small sized gravel • No metal in contact with water!

Write today for details

F. B. Leopold Co., Inc.
2413 W. Carson Street
Pittsburgh 4, Pa.

TAPAX
Takes the BANG out of
Manhole Covers

INSTALLING
TAPAX—a matter
of minutes



Brush Away
Dirt & Gravel

Cut Required
Length



Place Tapax
sticky side
down

Replace
Cover



Write for
Bulletin No. 14

JOSEPH G. POLLARD CO., Inc.
Pipe Line Equipment
NEW HYDE PARK, NEW YORK



WORTH TELLING

by Arthur K. Akers

★ **"GOD BLESS US EVERYONE!"** In those timeless words of Tiny Tim we wish you a Merry Christmas. And for the New Year, prosperity: not necessarily basic to happiness, but, like being crazy in Washington, it helps.

★ **DAVE GALLAGHER**, of Worthington Corporation Pumps, is up and about again at his Ridgewood, N. J. home after an operation. Dave's countless friends will rejoice.

★ **THE OLIVER CORPORATION** has acquired outstanding stock of Be-Ge Manufacturing Company, Gilroy, Calif. This makes a tenth plant for Oliver, further to round out its production line.

★ **MAYOR JOSEPH P. LAWLOR** of Ames, Iowa, looks out at you alongside. As President of the General Filter Company, Ames, he has a host of friends, nationwide, who will be glad to learn of his election as head of his hometown government.



★ **FOR FURTHER** portraiture of important water works figures, see the 1/2 Proportioners 1/2 ad. in this issue. It's a new and likeable note in making advertising personal. Teaming people and products that way makes for interest.

★ **ALLIS-CHALMERS** assumed officially on Nov. 1 the operation of the 72-year-old Buda Company at Harvey, Ill. Ralph K. Mangan, President of Buda since 1950, remains as such. Gas and diesel engines is where they interest you.

★ **ALL PURPOSE SPREADER COMPANY**, Elyria, Ohio, has been acquired by Blaw-Knox Company, Pittsburgh, to fill out its road equipment line.

★ **ROBERT MOSES**, public servant extraordinary and co-ordinator and

member of more boards and commissions around New York than we can quickly count, takes issue with us and George Martin's feature article coming in January **PUBLIC WORKS**. So we will print his dissent too, and commend it to you, in our February number.

★ **J. F. CATALANE** is new sales manager of Harnischfeger Corporation's P&H small excavator division. Concurrently, Robert P. Jones assumes the duties of assistant sales manager of this division.

★ **GAR WOOD'S** "Modern Way to a Clean Community" movie had its premiere at the October A.P.W.A. Congress in New Orleans. In Kodachrome and portraying characters irate and otherwise all too familiar to city officials, we understand its showing can be a big help to the latter. Ask Art. Dries at Gar Wood, Wayne, Mich. how to get and show it.

★ **CATERPILLAR TRACTOR** will have a new parts depot in operation at Peoria about February 1. This is their ninth. So again Caterpillar takes care of its own (customers.)

★ **BUCYRUS-ERIE COMPANY**, South Milwaukee, has a new color film, too: "Digging for Your Future." They even offered to let us see it—a new and appreciated note in industrial movie promotion.

★ **W. W. (Bill) SCOTT** now heads Federal Enterprises, Inc., Chicago, as President.

★ **SHERMAN PRODUCTS INC.** appoints Chesley H. Johnson, Worcester, Mass., district sales manager for Sherman trenchers in New England and New York.

★ **LINK-BELT** appoints Harvey V. Eastling as General Manager, Pacific Division, succeeding Ralph M. Hoffman, retired after 40 years.

★ **ANATOMY** is something every one has—but it looks better on a girl.
—Jacuzzi Injector

... *a good pipeline*

is the sum
of good parts . . .



▲ Testing the compressive strength of a concrete cylinder

Testing the tensile strength of steel reinforcing wire



The finest design and the most accurate workmanship cannot result in a superior product *unless* the materials used are of the highest quality. That's why Lock Joint assures the excellence of each of its pipes by constantly testing both the finished product *and* the individual materials used.

In the Company's research and testing laboratory reinforcing steel is tested for tensile strength . . . sand and aggregates are analyzed and classified . . . specimens of concrete in daily use are tested for compressive strength . . . gasket rubber undergoes varied and rigorous tests for

elasticity and durability . . . *all* ingredients are definitely proven before they are allowed to be put to use.

These carefully tested materials, together with Lock Joint's conservative design and precise workmanship, result in a finished product unexcelled in the pressure pipe field. If your project calls for pipe 16" in diameter or larger, designed for pressures common to water works practice, specify Lock Joint Concrete Pressure Pipe—the pipe that's tested from start to finish and backed by nearly half a century of pipe manufacturing experience.

SCOPE OF SERVICES *Lock Joint Pipe Company specializes in the manufacture and installation of Reinforced Concrete Pressure Pipe for Water Supply and Distribution Mains 16" in diameter or larger, as well as Concrete Pipes of all types for Sanitary Sewers, Storm Drains, Culverts and Subaqueous Lines.*

LOCK JOINT PIPE COMPANY

Established 1903

P. O. Box 269, East Orange, N. J.

PRESSURE PIPE PLANTS: Wharton, N. J., Turner, Kan.,
Detroit, Mich., Columbia, S. C.

SEWER & CULVERT PIPE PLANTS:

Casper, Wyo. • Cheyenne, Wyo. • Denver, Col. • Kansas City, Mo.
Valley Park, Mo. • Chicago, Ill. • Rock Island, Ill. • Wichita, Kan.
Kenilworth, N. J. • Hartford, Conn. • Tucumcari, N. Mex. • Oklahoma City,
Okla. • Tulsa, Okla. • Beloit, Wis. • Hato Rey, P. R. • Caracas, Venezuela





Carefully designed

...BY NATURE

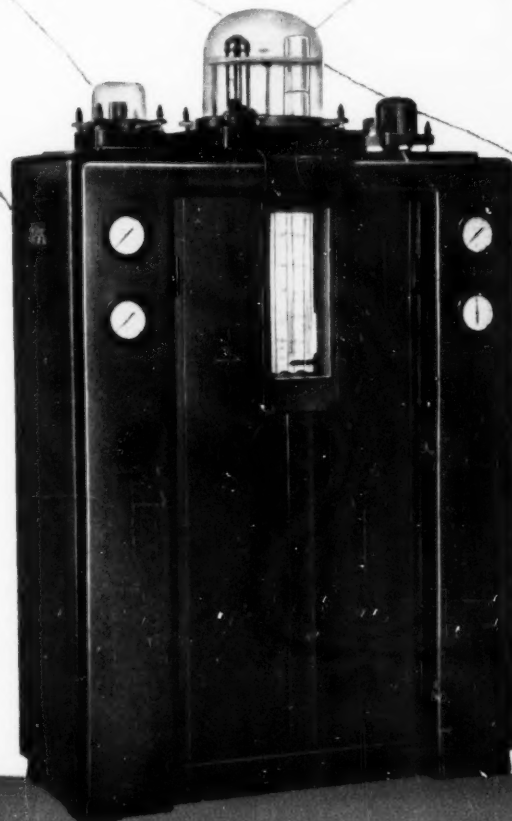
Carefully designed, too, are the dependable W&T Chlorinators which are familiar sights in thousands of installations all over the world.

For example — the W&T Visible Vacuum Principle which, by means of a glass bell jar, permits simple, visual checks on proper chlorinator performance.

And, for another — the inherent safety and economy of W&T Chlorinators, which are available with controls and accessory equipment to meet exactly each specific chlorination problem.

Behind these and many other design features is a nation-wide field organization, which, by "nature," is resourceful and technically skilled. The services of this organization are designed to give you — in the most efficient manner possible — the practical and proved results of a continuing quest for the best in chlorination equipment.

If, by nature, you're skeptical, you can easily prove it to yourself by passing along your own particular chlorinator problem. You'll hear from us promptly — and without obligation, of course.



S-84

WALLACE & TIERNAN
COMPANY INC.
25 MAIN ST BELLEVILLE 9, N. J.

THIS PUBLICATION
IS REPRODUCED BY AGREEMENT
WITH THE PUBLISHER. EXTENSIVE
DUPLICATION OR RESALE WITHOUT
PERMISSION IS PROHIBITED.